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OF THE

WOOLHOPE

NATURALISTS' FIELD CLUB.

[ESTABLISHED 1851.]

1881—1882.

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"HOPE EVER."

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ERRATA.

PAGE.

11—line 20, for "*spinosis-sirna*" read "*spinosissima.*"
13—line 28, for "Herfordshire" read "Herefordshire."
30—line 30, for "Maddus" read "Madden."
40—Foot-note should be added, "For Pondweeds of Herefordshire, see page 230."
51—"*Kœhleria*" twice, and also twice on page 52, read "*Kœleria.*"
60—for "*Arabis stratianum*" read "*Arabis stratiana.*"
61—fourth line from bottom, for "*L. Githago*, Linn." read "*L. Githago*, Lam."
62—line 23, for "*S. annua*" read "*S. annuus.*"
64—line 4, for "*scoparium*" read "*scoparius.*"
64—line 6, for "*O. arvensis*, L." read "*O. arvensis*, Auct."
64—line 19, for "*T. minus*, L." read "*T. minus*, Relban."
64—line 27, for "*O. sativa*, L." read "*O. sativa*, Lam."
65—sixth line from bottom, and also on last line, for "*Weike*" read "*Weihe.*"
66—line 1, for "*Weike*" read "*Weihe.*"
66—tenth line from bottom, for "*P. aria*, Hudson" read "*P. aria*, Hooker."
67—line 6, for "*E. parviflorum*, L." read "*E. parviflorum*, Schreb."
67—line 11, for "*Halorgiaceæ*" read "*Haloragiaceæ.*"
67—second line from bottom, for "*Crysosplemum*" read "*Chrysosplenium.*"
70—line 14, for "*C. arvensis*, L." read "*C. arvensis*, Curt."
72—eighth line from bottom, for "*vulgaris*" read "*vulgare.*"
74—line 26, for "*M. Piperita*, L." read "*M. Piperita*, Huds."
75—second line from bottom, for "*Ehrh.*" read "*Reich.*"
76—line 7, for "*P. vulgaris*, L." read "*P. vulgaris*, Huds."
85—line 4, for "*E. maximus*" read "*E. maximum.*"
86—eighteenth line from bottom, for "last" read "first."
89—eleventh line from bottom, for "*publicaris*" read "*pulicaris.*"
108—fig. 5 in Diagram, between pages 108 and 109, for "*Cladosporum*" read "*Cladosporium.*"
139—line 1, for "*malvecearum*" read "*malvacearum.*"
139—line 6, for "*Æcedium*" read "*Æcidium.*"
139—line 10, for "*Peridermum*" read "*Peridermium.*"
175—line 5, after President, add "of the Malvern Naturalists' Field Club."
180—line 11, for "quarted" read "quartered."
230—in the foot-note, for "June 17th, 1881," read "July 12th, 1881, see page 40."
243—lines 26 and 30, for "Stukely" read "Stukeley."
254—line 21, for "were" read "was."
258—tenth line from bottom, for "Copped Wood Hill," read "Coppet Wood Hill."
262—tenth line from bottom, for "*Glœocapsa*" read "*Glœocapsa,*" and for "F.R. Met. Soc." read "F.R.M.S."
264—seventeenth line from bottom, for "*inops*" read "*inopus.*"

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McCullough, D. M., M.D., Larchfield, Abergavenny.
Merriman, J. Jones, M.D., 45, Kensington Square, London.
Metcalfe, Rev. G. M., Pipe and Lyde, Hereford.
Middleton, Mr. J., Westholme, Cheltenham.
Morgan, Captain W., R.E., Hereford.
Morris, Mr. J. Griffith, St. Owen Street, Hereford.
Moore, Mr. H. C., King Street, Hereford.
Nicholson, Mr. Thomas, St. Peter Street, Hereford.
Norman, Mr. J., Ross.
Norris, Mr. J. E., J.P., Castle Street, Hereford.
Orgill, Rev. V. T. T., 42, Mill Street, Ludlow.
Owen, Rev. E. J., Tretire, Ross.
Palin, Rev. E., Linton, Ross.
Paris, Mr. T. C., Hampton Lodge, Hereford.
Pateshall, Mr. Evan, Allensmore Court, Hereford.
Phillips, Mr. E. C., Solicitor, Brecon.
Phillott, Mr. G. H., Leekhampton, Cheltenham.
Phillott, Rev. H. W., Staunton-on-Wye, Hereford.
Piper, Mr. George H., F.G.S., Court House, Ledbury.
Powell, Rev. T. Prosser, Peterchurch, Hereford.
Power, Captain, The Hill Court, Ross.
Poole, Rev. W., Hentland, Ross.
Pulley, Mr. Joseph, M.P., Lower Eaton, Hereford.
Purchas, Mr. Alfred, Broad Street, Ross.
Rankin, Mr. James, M.P., Bryngwyn, Hereford.

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Reid, Captain Mayne, Frogmore House, Ross.
Ridley, Rev. O. M., Bishopstone, Hereford.
Riley, Mr. J., Putley Court, Ledbury.
Roberts, Mr. A. W., Thornton, Aylstone Hill, Hereford.
Robinson, Mr. Stephen, Lynhales, Kington.
Rootes, Mr. Charles, St. Owen Street, Hereford.
Salwey, Mr. Theophilus J., Ludlow.
Severn, Mr. J. P., Penybont Hall, Penybont.
Shackleton, Rev. Thomas, Broomy Hill, Hereford.
Shaw, Mr. W., Bridge Street, Hereford.
Shellard, Mr. Orlando, Barton Manor House, Hereford.
Shepherd, Rev. W. R., Broomy Hill, Hereford.
Smith, Mr. R. Vassar, Ashfield, Great Malvern.
Smith, Rev. T. T., Thruxton, Hereford.
Southall, Mr. Henry, F.R. Met. Soc., Ashfield, Ross.
Stanhope, Rev. B. L. S., Byford, Hereford.
Stanhope, Rev. W. P. S., Holme Lacy, Hereford.
Stillingfleet, Rev. H. J. W., Hampton Bishop, Hereford.
Stoodley, Rev. T., County College, Hereford.
Swinburne, Mr. W. A., Dulas, Hay.
Symonds, Mr. J. F., Broomy Hill, Hereford.
Tatham, Rev. F. H., Cathedral School, Hereford.
Taylor, Rev. J. R. G., The College, Hereford.
Taylor, William, M.D., 21, Crockherbtown, Cardiff.
Tedman, Rev. J., Much Birch, Ross.
Thackwell, Rev. Stephen, Little Birch, Ross.
Thomas, Rev. J. Jones, Llanthomas, Hay.
Thomason, Mr. Richard, Drybridge House, Hereford.
Truscott, Mr. Charles, Jun., Trevarrick, St. Austell, Cornwall.
Turner, Mr. Thomas, St. Owen Street, Hereford.
Tweed, Rev. H. W., Bridstow, Ross.
Stooke-Vaughan, Rev. F. S., Wellington Heath, Ledbury.
Vevers, Mr. Henry, St. Owen Street, Hereford.
Waldron, Mr. Clement, Llandaff.
Warner, Rev. R. H., Almeley, Kington.
Wegg-Prosser, Mr. F. R., Belmont, Hereford.
Wheatley, Mr. T. E., West Bank, Ledbury.
Whitfeld, Mr. W. C., St. Ethelbert Street, Hereford.
Williams, Mr. E. Colt, Gate House, Hereford.
Wilson, Daniel, M.D., Dilwyn.
Wood, Mr. H. H., White House, Vowchurch, Hereford.
Wood, J. H., M.B., Tarrington, Ledbury.
Woodhouse, Mr. J. G., Burghill House, Hereford.
Woollam, Rev. J., Yarkhill, Hereford.
Woollett, Mr. R. F., The Mount, Newport, Mon.
Wyatt, Rev. W., Hope-under-Dinmore, Leominster

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RULES

OF THE

Woolhope Naturalists' Field Club.

I.—That a Society be formed under the name of the "Woolhope Naturalists' Field Club," for the practical study, in all its branches, of the Natural History of Herefordshire, and the districts immediately adjacent.

II.—That the Club consist of Ordinary Members with such Honorary Members as may be admitted from time to time; from whom a President, four Vice-Presidents, a Central Committee, Treasurer, and Honorary Secretary be appointed at the Annual Meeting to be held at Hereford in the early part of each year. The President and Vice-Presidents to change annually.

III.—The Central Committee shall consist of three Members, resident in the city or in its immediate vicinity, with the President, Vice-Presidents, and Honorary Secretary, *ex-officio*. It shall be empowered to appoint an Assistant Secretary; and its duties shall be to make all the necessary arrangements for the meetings of the year, and take the management of the Club during the intervals of the meetings.

IV.—That the Members of the Club shall hold not less than three Field Meetings during the year, in the most interesting localities for investigating the Natural History of the district. That the days and places of such regular meetings be selected at the Annual Meeting, and that ten clear days' notice of each be communicated to the Members by a circular from the Secretary; but that the Central Committee be empowered, upon urgent occasions, to alter the days of such regular Field Meetings, and also to fix special or extra Field Meetings during the year.

V.—That an Entrance Fee of Ten Shillings shall be paid by all Members on election, and that the Annual Subscription be Ten Shillings, payable on the 1st of January in each year to the Treasurer, or Assistant Secretary. Each Member may have the privilege of introducing a friend on any of the field days of the Club.

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VI.—That the Reports of the several meetings and the papers read to the Club during the year, be forwarded, at the discretion of the Central Committee, to the *Hereford Times* newspaper for publication as ordinary news, in preparation for the *Transactions* of the Club.

VII.—That the cost of any lithographic or other illustrations be defrayed by the author of the paper for which they may be required, unless the subject has been taken up at the request of the Club, and in that case, the cost of such illustration to be paid for from the Club funds, must be specially sanctioned at one of the general meetings.

VIII.—That the President for the year arrange for an address to be given in the field at each meeting, and for papers to be read after dinner; and that he be requested to favour the Club with an address at the Annual Meeting on the proceedings of the year, together with such observations as he may deem conducive to the welfare of the Club, and the promotion of its objects.

IX.—That all candidates for Membership shall be proposed and seconded by existing Members, either verbally or in writing, at any meeting of the Club, and shall be eligible to be balloted for at the next meeting, provided there be FIVE Members present; one black ball in three to exclude.

X.—That Members finding rare or interesting specimens, or observing any remarkable phenomenon relating to any branch of Natural History, shall immediately forward a statement thereof to the Hon. Secretary, or to any member of the Central Committee.

XI.—That the Club undertake the formation and publication of correct lists of the various natural productions of the County of Hereford, with such observations as their respective authors may deem necessary.

XII.—That Members whose subscription shall remain for *three* years in arrear, after demand, be held to have withdrawn, and their names shall accordingly be omitted from the list of Members at the ensuing Annual Meeting.

XIII.—That the Assistant Secretary do send out circulars, ten days at least before the Annual Meeting, to all Members who have not paid their subscription, and drawing their particular attention to Rule XII.

XIV.—That these Rules be printed annually with the *Transactions*, for general distribution to the Members.

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Woolhope Naturalists' Field Club.

1881.

THE annual meeting of the Woolhope Naturalists' Field Club was held on Tuesday, April 19th, in the Club Room. Among the members present were the President (Mr. J. H. Knight), Rev. A. Ley (President-elect), Dr. Bull, Ald. Cam, Mr. Whalley Armitage, Mr. Beddoe, Mr. Curley, C.E., Mr. Chapman, Mr. Docking, Rev. E. J. Holloway, Rev. W. A. Horton, Rev. H. B. D. Marshall, Rev. G. M. Metcalfe, Mr. Shellard, Rev. W. P. Scudamore Stanhope, Rev. R. H. Warner, and Mr. Theophilus Lane (Secretary).

The following is the list of officers for the current year:—President, Rev. Augustin Ley. Vice-Presidents: Mr. J. H. Knight, Mr. G. H. Piper, Mr. O. Shellard, Mr. E. G. Steele. Central Committee: Mr. T. Curley, Mr. C. G. Martin, Mr. J. Griffith Morris, Mr. Shellard. Editorial Committee: Dr. Bull, Dr. Chapman, and Mr. J. Griffith Morris. Treasurer: Mr. Thomas Cam. Auditors: Mr. James Davies, Mr. J. T. Owen Fowler. Secretary: Mr. Theophilus Lane.

The financial statement of the Club for 1880 was read and passed.

The dates and places of the field meetings for the present year were fixed as under:—

Thursday, May 19th.—Tewkesbury (joint excursion with the Malvern Club).

Thursday, June 16th.—Monmouth.

Tuesday, July 12th.—Rhayader (ladies' day).

Thursday, August 18th.—Aymestry.

Thursday, October 6th.—Fungus Foray.

Dr. Bull then gave a report on the *Herefordshire Pomona*, and read the financial statement for part III.; the plates for Part IV. were exhibited, twelve in number, containing 63 different varieties of fruit.

The Rev. A. J. Capel and Mr. Pulley, M.P., were balloted for and elected, and seven other gentlemen were proposed as members of the Club.

The dinner was held at the Green Dragon Hotel, and after the health of "The Queen" had been cordially received, Dr. Bull read a paper on "The Orchard; its commercial aspect and future prospects," prepared for the *Herefordshire Pomona* by the Rev. C. H. Bulmer, who was unavoidably absent.

The President then delivered his retiring address. Votes of thanks were passed to Dr. Bull, Mr. Bulmer, and the President, and suitably acknowledged.

The Address of the retiring President will be found at the end of the last volume.

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JOINT MEETING OF THE

Woolhope and Malvern Field Clubs,

MAY 19th, 1881.

VISIT TO TEWKESBURY ABBEY AND BATTLEFIELD.

ON Thursday, the 19th May, the Woolhope and Malvern Field Clubs united for the purpose of visiting the site of the final struggle between the rival houses of York and Lancaster, which great historical event happened on Saturday, 4th May, 1471, and to inspect the grand old Norman Abbey of Tewkesbury, recently restored under the supervision of Mr. J. Oldrid Scott, son of the late eminent Sir Gilbert Scott. The weather was everything that could be wished. Some early rain had laid the dust and made the whole country redolent with grateful odours. The principal start was from Ledbury Railway Station, where four spacious, well-appointed carriages, supplied by Mr. Rayner, received the members. The route lay through Eastnor, and by the Hollybush Pass to the curious moated Manor House, Birtsmorton Court, celebrated by the publication of Mr. Symonds's historical novel, "Malvern Chase," which rivals in interest some of the favourite productions of Sir Walter Scott. In passing, several places of interest noticed in Mr. Symonds's delightful book were carefully observed, such as the "Howling Heath," "Bronsil Castle," the home of Sir Hugh Claverley, "The Gullet," "The Dead Oaks," the position of Carfax's Castle, and other spots, and particularly the great "Ragged Stone Hill" of Cambrian sandstone, whose shadow (happily so rarely seen) betokens the most dire evil to those upon whom it rests.

At Birtsmorton the Malvern contingent joined the party, which now, with the ladies who graced the meeting with their presence, numbered about 80 persons. Mr. Beavan, with his customary good nature, welcomed his numerous visitors to his curiously interesting home, and having assembled in the wainscoated dining-room Mr. Symonds read the following paper on the Manor House, stripped of its romance:—

BIRTSMORTON COURT AND CHURCH.

There are few places in the County of Worcester more intersting than Birtsmorton Court and Church. Both were erected centuries ago among the great woodlands of Malvern Chase, and around them have gathered historic associations, legends, and superstitions, which it is well should be rescued from utter oblivion. The original founders were Saxons, and were Birts or Brutes, for Birtsmorton was known in the days of Edward the Confessor, and is mentioned in Domesday.

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In Norman times one John, Baron of Monmouth, appears to have been Lord of Birtsmorton, and those who have studied the architecture of the basement believe they can trace relics of the foundation of a Norman keep. There was a Brute, or de Brute, here in the days of Edward I. In his reign, too, the Birts or Brutes intermarried with the family of Ruyhalles, who took their name from Rhyalle, the hamlet in the parish of Upton-on-Severn.

In the days of Henry IV. we are confronted with the two great historic names of Owen Glendower and Sir John Oldcastle. Tradition says that one of the great Welsh chieftain's daughters married John Scudamore, of Kentchurch, in the County of Hereford. When on a visit to the late Colonel Scudamore, some years ago, I directed his attention to the fact that the armorial bearings of his ancient family ornamented one of the panels in the old room at Birtsmorton Court, when he showed me a very old painting on panel, which he told me tradition had assigned as the portrait of Owen Glendower. Colonel Scudamore was acquainted with the tradition that Glendower was in the habit of disguising himself in a shepherd's dress, and going backwards and forwards to his daughter's and other friend's houses, among which were Birtsmorton Court and the Old Grange, at Dymock. Another tradition is that he was buried at Monnington, in Herefordshire. The Transactions of the Woolhope Club for 1869 contain a notice of "The ancient Forest of Deerfold" and "The Lollards in Herefordshire," by Dr. Bull, who shows how this great forest afforded a refuge to some of the earliest and most noted followers of Wycliffe, and among these we find the name of Walter Brut, a "layman and learned," and who was probably one of the family from Birtsmorton. For ages tradition has fixed upon Birtsmorton Court as one of the hiding places of Sir John Oldcastle, and I have mentioned elsewhere ("Old Stones," new ed.) how the venerable Mrs. Webb, of Ledbury, now in her 103rd year, well remembers that she was frightened as a child when she was shown the hiding place of Sir John Oldcastle, the secret chamber in the panelled room. The Brutes seem to have intermarried with the family of the Oldcastles, as in 1420 we find a Richard Oldcastle concerned in the presentation of the living with John de Brute. About this time we find that the Brutes of Morton held the manor of John of Gaunt, "time-honoured Lancaster," on the presentation of a rose. The Tudor rose, too, the heraldic emblem of the Dukes of Lancaster, appears on the old seats in the church.

It is not easy to make out when the ancient Cornish family of Nanfan came to *reside* at Birtsmorton. There was a great Cornish esquire, John Nanfan, whose last will is dated in 1446, and whose effigy, as a man in armour, appears upon the south side of the old mediæval altar tomb in Birtsmorton Church; but he was buried in Tewkesbury Abbey, and gave 40 marks for masses for the good of his soul. He was esquire "for the body with King Henry VI." The brass tablet of this tomb is gone, and it is not possible now to say to whom it was erected; but, as we find there the effigy of Richard Nanfan, who became Captain of Calais, presented to the living in 1501, and was "squire to Henry VII," it is probable that the tomb was built to the memory of Sire John Nanfan, to whom Cardinal Wolsey was chaplain when he was but a "boy bachelor," and whose *ancestors* figure as

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effigies. It seems probable, too, that although other Nanfans held the manor, this was the first who really *lived* at Birtsmorton Court. The "Oumphrey Arundel," "Lord John Arundel, Bishop of Chester," and "Dame Elizabeth Lygon," an ancestress of the Beauchamps of Madresfield, were, I suppose, relations and connections of the Nanfan family; but that the tomb was not erected until the time of Henry VII. is certain from the effigies of Richard Nanfan, who was his esquire. I like to think that this tomb was erected through the gratitude of the great Cardinal Wolsey to the memory of his early friend and patron, John Nanfan, who presented Master Thomas Pechye to the living, A.D. 1510. With respect to the armorial quarterings upon the panels, it is the opinion of those versed in heraldy that some of the devices are as old as the Wars of the Roses, that these were added to by the Nanfans in the days of Henry VII., and that in the time of Queen Anne the Earl of Bellomont made one or two additions. In the time of Charles I. "the Bloody Meadow duel" was fought between Sir Giles Nanfan and the lover of his sister Bridget. The lover was buried in the Berrow Churchyard, and Bridget left the "Bloody Meadow" by will to the poor of Berrow, and devoted a sum to the payment of a minister to deliver a sermon against the sin of duelling. I may here mention that many years ago I went with Sir William Guise to examine the parish registers respecting the name and date of the burial of Bridget's lover. We found the entry, and made a copy, which I regret to say I have mislaid. Some time ago Sir William went with me to examine the register a second time, but we were informed that the register book "was *lost*," and Mr. Harkness, the former incumbent, does not remember ever to have seen it. The book certainly disappeared between the incumbency of the Rev. James Hughes and that of Mr. Harkness. Inquiries should be made everywhere respecting this abstraction.

Bridges Nanfan, the last male heir of the direct line, died in 1704, and his only daughter, Catherine, married Richard Coote, Earl of Bellomont, who died in 1700. This lady distinguished herself by marrying four husbands, the last she married at the age of 72. Neither of the Earls of Bellomont distinguished himself in anyway whatever; but the English stateman, William Huskinson, was born at Birtsmorton Court, and his father was churchwarden in 1797. In the church there is a fine monument to Rear-Admiral Caldwall, the second husband of Catherine Nanfan.

This paper, on the ancient home of Rosamond and Sire Hildebrand, was listened to with the most wrapt attention, and the party again started to find another delightful object of interest in "Payne's Place," Bushley, where the Rev. E. R. Dowdeswell met the clubs, and very kindly explained the curious features of the farm house, which has long formed a portion of the estate of his ancestors. At the close of the battle of Tewkesbury, Margaret, seeing her gallant son a prisoner, her troops slain or dispersed, all hope gone, committed herself to the care of two poor monks belonging to some small religious house in the neighbourhood. There was no bridge then, but the guides knew well the ford which existed at the Lower Lode, and safely conducted her to Bushley, which then owned

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the Earl of Warwick for its lord, and lodged her in the house of Thomas Payne, a trusty supporter of the House of Lancaster.

Through the kindness of the Rev. E. R. Dowdeswell we are enabled to supply the following curious particulars relating to

PAYNE'S PLACE, BUSHLEY.

The fine old half-timbered house now occupied by Mr. W. Stokes, was known in the old times by the name of "Payne's Place," and is so described in old deeds. It was built after the fashion of the houses used by the small gentry of the day (about 1405). The framing was of solid oak, the spaces between the timbers being filled with "wattle and daub," and whitewashed. The chief feature in the house was the hall. That at Payne's Place was 20 feet square; it was open to the roof, and the rafters were supported by a very handsome arch of oak, which may still be seen in perfect preservation in one of the bedrooms. In this great hall the household dined at one great table. The fire burnt in the midst of the hall, and the smoke found its way up into the old rafters of the roof, there being no chimney to conduct it, as now, into the outer air. These halls, large, cold, and comfortless, were usually screened from the main door by a panelled oak partition, which ran across the room about 10 feet high. A portion of such a screen was found at Payne's Place, where it seems to have been more than usually necessary, for there were two doors in this hall exactly opposite to each other, and a right of way through this passage from Bushley to Tewkesbury had existed from very early times, which right was claimed and acknowledged within the memory of some now living. If the house was built as we may safely conjecture, about the year 1450, the bedroom floor which hides the interior of the handsome roof from ordinary visitors, was probably inserted in the hall about 100 years later. The eastern wing was pulled down early in this century, and replaced by ordinary and ugly brickwork. The overhanging upper storey in the remaining wing, and the beautiful barge boards in the gable are still extant in good condition.

Such then was the house at Bonnett's End when first we hear of it. It was then inhabited by a man of substance, named Thomas Payne, who had probably built it. We do not know much of good Master Payne, or where he came from. One William Payne, of Rodborough, in the County of Gloucester, married Margery Spelman, of Spelman's Court, in that parish, in the year 1461, and through his wife inherited the house and property there, calling the house after his own name, Payne's Court. Our Mr. Thomas Payne, of Bushley, who called his house at Bonnett's End Payne's Place, was probably a connection of the family of the Payne's, of Rodborough, and like them seems to have been a clothier by trade. He was a faithful retainer of the great Earl of Warwick, who was Lord of the Manor of Bushley. In a fine piece of oak carving, which was originally in the house at Payne's Place, but now figures in the cottage of A. Cole, at Churchend, may still be seen the "Bear and Ragged Staff," which was the crest and cognizance of that noble house.

While Warwick made and unmade kings of England, good Master Payne lived quietly in Bushley, but at last, if he would not go to the wars, the wars

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came to him. In 1471, Margaret of Anjou, Henry's courageous Queen, was caught with her army, by the victorious Edward, of Tewkesbury. We all know the result of that fatal field. After the batttle Margaret was conducted to Payne's place. Master Payne and good Dame Ursula, his wife, welcomed the fallen Queen, and prepared for her that pretty room in the eastern wing of the house, on the first floor, with its great window looking out towards the sad battle-field, and the glorious old abbey rising over it, which still is called, in memory of that night, "The Queen's Room," and although the historians never knew it, the fact was handed down through all these centuries by tradition, and "The Queen's Room" is still to be seen in Payne's place, in which Queen Margaret slept after the disastrous day at Tewkesbury.

This was in 1471, and time was flying by, and good Master Payne remembered that some day he must die. Now there had been a nice little church here, at Bushley, for many a day served by the monks from Tewkesbury. It was nice for the neighbours to have a church close at hand, but they felt it rather hard that, though while living they could use the church at home, when dead they had to be carried across the river, all the way to Tewkesbury, to be buried, and all because there was no churchyard at Bushley; and so Master Payne busied himself about the matter. He went round to all his neighbours to get them to sign a petition to the Abbot of Tewkesbury, to ask him to grant them land for a churchyard, and to get it consecrated, and, after the usual fuss, I suppose the petition was granted, and is still to be seen at Pull Court, bearing the mark, or signature, or seal of all the leading parishioners, though the seal of the Abbey is gone. The deed was dated April 12, 16 Ed. IV., 1477-8, and Thomas Payne died in March, 1500, and was buried in the churchyard which his zeal had obtained for his fellow-parishioners. The brass effigies of himself, and his wife, and his children, were placed in Bushley Church, with the following inscription:—

"Hic jacet Thomas Payne et Ursula uxor ejus: per cujus quidem Thomae "laborem instantiam, licentia prius habita fuit et obtenta ad sepeliendum in hac "ecclesia et ejusdem cemetrio fidelium corpora. Quivero Thomas obiit penultimo "die mensis Octobris A.D. milesimo quingentesimo. Quorum animabus pro-"pitietur Deus."

Beneath this inscription were the effigies of their seven sons and four daughters.

In the lapse of time the inscription, together with the figures of the children, disappeared, the two principal figures of Thomas Payne and his wife alone remaining. The words of the inscription, however, having been preserved in Dr. Nash's *History of Worcestershire*, they were again transferred to a brass plate, and restored to their proper place in connection with the brasses.

By his will, which is preserved at Somerset House, we find that he left his house at Bushley, with all his goods, to Ursula his wife.

Fifty years after Thomas Payne's death, we have a family of the name of Stratford settled at Payne's place, which family, for more than 100 years, lived there highly respected. This was a branch of a very ancient family which had held large possessions in the parishes of Farmcote, Temple Guyting, Hawling, &c., since the year 1320. The head of the family resided at Farmcote, and Mr. Strat-

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ford, of Bushley, seems to have been a son of the branch settled at Guyting. He married Margaret, daughter of the William Tracy, of Toddington and Stanway, who died in 1530, under strong suspicion of being a heretic.

Margaret and her husband came to settle in Bushley, and her brother William Tracy, dying in 1558, left all his lands in Bushley to his sister Margaret Stratford, with remainder to her sons, Anthony and Giles, while his pewter vessels he bequeathes to her daughter. This Mrs. Margaret Stratford died a widow, in a good old age, and was buried in Bushley in 1621. Their son Anthony Stratford succeeded them, and on April 22nd, 1577, married a Bushley girl named Margaret Heyward. The old house probably wanted doing up, but the beautifying was reserved for the bride's own sitting-room on the ground floor of the eastern wing. The timber he coloured brown, leaving the plaster white, and close under the ceiling, on a white ground, enclosed in a frame-work of a coloured pattern, ran couplets of quaint English verses, painted in Old English character, which ran all round the room. This interesting decoration had been covered up in later years with the ordinary lath and plaster for wall papering, and only two of the couplets could be saved when the battening was removed. They run as follows, and are still in good preservation :—

"To lyve as we shoulde always dye it were a goodly trade,
"To change lowe Deathe for Life so hye no better change is made :
"For all our worldly thynges are vayne, in them is there no truste,
"We se all states awhyle remayne and then they turn to duste."

Between the couplets were two shields illuminated with the initials A.S. and M.S., and the date, 1574, putting it beyond all doubt that the decoration was executed in honour of the young bride. They had several children who were all baptised in Bushley Church ; William, Thomas, who succeeded his father in 1608, Simon, John, and Elizabeth. Mrs. Stratford must have been nearly 90 years of age when she died in 1648, and the respect and love which her husband had earned for himself is touchingly recorded in the parish register at the time of his death. His son and heir, Thomas Stratford, born in 1587, married, about 1619, a Bushley girl named Joan Trigge. They had one son, Anthony, who was born in 1620. These were troublous times, and young Anthony Stratford, coming of a good old stock, started early with his kinsman, Mr. William Stratford, of Farmcote, to join King Charles's army. He fought with great zeal and courage throughout the war, until compelled, when all was lost, to compound with the Parliament for his estates at Bushley for £40, his more wealthy cousin, at the same time, paying no less than £700 to retain his family estates at Farmcote. But the expenses of the war had far exceeded the loyal gentleman's means, and like many another noble hearted servant of King Charles, he had brought upon himself utter ruin in his master's cause ; on the 17th August, 1676, he executed a deed by which "All that "capital messuage, &c., in Bushley, at a place called Bonnett's End, and wherein "the said Anthony Stratford dwelleth, called and known by the name of Payne's "Place," together with all his lands in Bushley, was sold to Mr. Richard Dowdeswell, of Pull Court. From that time to this, the old house has been in the same family, and in these quiet times has had little of interest to add to the stirring records of the past. The spirit of one of the old Stratfords was said to haunt the

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house, but none of the present generation have ever seen it. The last relics of the staunch old cavalier, which were in existence some fifty years ago, were some helmets and other armour which used to be in a small room on the top of the house, known by the name of "Old Stratford's Room."

Mr. Anthony Stratford was never married, nor did he leave any representatives of his family in Bushley. The Farmcote branch, also ruined by their devotion to King Charles, in 1753, were renting as tenants, under the Tracys, the land which their fathers had owned. The Guyting branch has ended in female issue, and is represented, I believe, by the Stratford Collins, of Walford, Hereford.

Thus, while the old families have died out, the old house they built, adorned, and dwelt in, outlasts its owners, and after 400 years bids fair to last as long again.

We have allotted a considerable space to this interesting old residence and its owners, because the facts there stated are novel, and are not such history as can be obtained from books.

From Payne's Place the travellers hurried on to the battle-field, where, on the site of Queen Margaret's camp, the Rev. W. S. Symonds gave an oral but very vivid account of

THE BATTLE OF TEWKESBURY.

After pointing out that the extent of the earthworks indicated the existence of a camp probably constructed in pre-historic times, and that the tired soldiers of the Queen could not have thrown up these defences during the few hours which elapsed between their arrival and the commencement of the battle, the learned lecturer expressed his belief that tradition was correct in calling this the head-quarters of the Queen's army, and that she had passed the night preceding the great struggle upon that spot. He then described how, on Thursday, the 2nd May, 1471, the Queen proceeded on her march to Berkeley, and from thence to Gloucester, with the intention of passing through the city in order to join the army of the Earl of Pembroke. But King Edward had commanded the Governor of Gloucester Castle not to suffer the Queen to enter the city, and she hastened on with her tired followers to Tewkesbury, with the intention of there crossing the Severn. The Queen and her army reached Tewkesbury in the afternoon of Friday, having travelled, during that day and the preceding night, 36 miles with very little refreshment, for the country was nearly depopulated, and in an abject state of poverty. Meanwhile King Edward had made one of the most extraordinary marches ever known, having taken the high ground along the ridge of the Cotswolds, intersected by many steep valleys, and the day was hot and weary. It would have been impossible to have provisioned the army at the then poor village of Cheltenham, and they carried food with them on their sumpter horses, and found stores of provisions and whole casks of wine at Prestbury, a favourite hunting seat of the Bishops of Hereford. It was moonlight before the wearied soldiers reached Fiddington Common, where water could be obtained, and some little shelter for the men. The King slept at Fiddington Grange. Mr. Symonds then described how the army was marshalled, and the attack was made in the mist of

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the early morning, and a temporary check sustained by the King, but how his men were saved by a thick hedge and ditch from the effects of the desperate charge of the Duke of Somerset. How the Duke of Gloucester cleared the trackway to the walls of Ham Castle, and then made a flank attack on the hill where Lord Wenlock and the Frenchmen were posted, and how, when it succeeded, the Duke of Somerset, irate at not having been reinforced, struck out Lord Wenlock's brains, and the battle was lost, and desperate slaughter followed. But the whole story is so admirably told in Mr. Symonds's book, that we must refer our readers to it for further details.

TEWKESBURY ABBEY.

Here a great archæological treat was in store, and the members had the privilege of listening to a most careful, learned, and elaborate paper on the Abbey, read by the Vicar of Tewkesbury, the Rev. Hemming Robeson.

After glancing at the early history and erection of a monastery by Oddo and Doddo, sons of a Saxon nobleman, of the kingdom of Mercia, on a spot where it was said one Theocus, a hermit, had his dwelling, the able and rev. lecturer gave an historical account of the notable personages and families who were successively lords of Tewkesbury and patrons of the Abbey, showing also which portions of the structure belong to the various periods of its history. The Fitz-Hamon Chapel carried them back to the time following the Norman Conquest in 1066, when enormous estates were made over to warlike nobles, and when habitual lawlessness and frequent crime had little to compensate them except the munificence by which buildings like the Abbey were raised and endowed. The tiles of the floor bore the arms of Fitz-Hamon, impaling those of the Abbey, and on his tomb being opened in 1795, bones were found which might reverently be supposed to be those of the founder himself. The new window in the 13th century chapel (choir vestry) represented Fitz-Hamon and his wife Sybil, in the character of church founders, holding between them a model of a cruciform church, but it was left to the first Earl of Gloucester to complete the work of his father-in-law. The building progressed step by step. A roof of oak, the central tower with its interlaced arcading, a lofty wooden spire above, gradually all were completed, and then after 20 years work, with great pomp, the noble church, in its most remarkable features the same as now seen, was dedicated to God, November 20th, 1123. It was interesting to note that when, 750 years afterwards, an eminent architect surveyed the work of this Norman period, there were ample proofs of the sound condition of the main fabric, and that those early builders built well and dreamed not of a "perishable home." In 1178, a destructive fire destroyed the monastic buildings, and left its mark. Mr. Robeson then proceeded to trace the several patrons and historical personages who had taken an active part in the building and support of the Abbey —the De Clares, De Spencers, and Beauchamps. The history of the chapels, tombs, and graves of illustrious personages was graphically told, and we regret that the space at our disposal does not admit of fuller justice being done to this excellent paper, the preparation of which must have required considerable time and research. The vicar concluded by saying it was a notable fact that as the munificence of the founders had left an indelible mark here, so, during those troubled times of the

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Wars of the Roses, church restoration had been active elsewhere—at Winchcomb, at Gloucester, at Great Malvern Priory, at Little Malvern, and also at Hereford Cathedral. Church restoration had been busy again within these venerable walls during the past few years, amid different surroundings and in quieter times. If time permitted he would gladly have given some details of what had been done. This, however, he could safely say, that the one object of those who had engaged in it had been, while adapting the church for the worship of Almighty God, in far altered times, to maintain intact each relic of the past, and to preserve the memorials of the Fitz-Hamons, the De Clares, the De Spencers and the Beauchamps, for the loving admiration of generations yet to come.

The large company afterwards walked round the Abbey, the interesting features of the buiding being ably explained by the Vicar.

This exceedingly interesting feature of the day's proceedings having been completed, the party reassembled at the Bell Hotel, where about 70 partook of an excellent dinner, but, as is too frequently the case, the waiting could not fairly be praised, nevertheless, the gentlemen of the party kindly undertook to supply deficiences, and that which might have caused annoyance, became merely the source of merriment. The chair was taken by Mr. G. H. Piper, F.G.S., President of the Malvern Field Club, who said, that although the clubs discourage the ordinary after dinner speeches, they reserve the privilege and never deny themselves the pleasure of drinking the health of Her Most Gracious Majesty the Queen, and in these days when brazen atheism and unmitigated disloyalty are rampant in the land —when impudent infidels thrust themselves into positions—which should be places of honour—filled by honourable men, and they who should know better foster those foul pretenders, it becomes the duty of all who love their country, and are proud of its greatness, to rally round the throne, and defend the institutions which our ancestors fought for and established.

Votes of thanks to the Rev. W. S. Symonds and to the Rev. H. Robeson for the admirable papers they had read, and the kind assistance they had afforded, were proposed by the Chairman, and ably seconded by Dr. Bull.

Time did not permit the reading of Mr. Ley's paper, prepared for this meeting. A botanical subject, so carefully treated, is better enjoyed when read at leisure.

NOTES ON SOME LESS-KNOWN HEREFORDSHIRE PLANTS.

By Rev. A. Ley—May 19th, 1881.

The present paper makes no pretensions to be what is called critical. It arises out of the simplest practical necessity: the necessity namely of obtaining information, greater in amount and more accurate in character, respecting the flowering plants and ferns inhabiting the County of Hereford, with a view to the comple-

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tion, at no very distant date, of the publication of a flora of the county. I have therefore selected mainly, as the subject of my notes to-day, those plants upon which practical information is required, whether of their existence or of their range in our area: and I have the more pleasure in bringing the subject before you to-day, because it is the east of the county, upon which the existing notes for the flora are the poorest: I hope therefore to be able to enlist the zeal of the botanical members of the Malvern Club, whose guests we are to-day, in furnishing material in the shape of notes and dried specimens, so as to prevent the very undesirable result of certain districts being a comparative blank both in the county flora and in the county herbarium. In this division of the county—that is in the whole of the Districts 4, 5, 8 and 9, as defined in the First Part of the Herefordshire Flora, published in the Transactions of the Woolhope Club for 1866; from Ledbury in the south to Ludlow in the north—I have never myself had opportunity of working. Yet they are richer perhaps than most parts of Herefordshire in rarities: and it has been impressed upon me in going through the existing Notes for the Herefordshire Flora, that the Malvern Hills present in some respects a peculiar vegetation, distinct from the rest of Herefordshire. Not to dwell upon *Epipogium aphyllum* once found at Tedstone Delamere, we have no difficulty in pointing out other rare plants characteristic of their districts. We have three roses—*spinosis-sirna*, *Donniana*, and *systyla* only recorded from these districts; two of them in close proximity to the Malvern Hills: *Pimpinella magna* confined to a single spot in District 4: *Epipactis media*, and *Carex axillaris*, so exceedingly rare in the rest of the county, reported as common about the Malverns: *Plantago Coronopus*, *Hordeum sylvaticum*, and *Equisetum hyemale*, each of them confined to single localities in the rest of the county, reappearing here. These remarks with regard to rarities, might be much extended. But while no botanist neglects rarities, many pass over common plants. Our list of the common plants for three of the districts mentioned—the Ledbury, Bromyard and Frome District, and especially the last two—are exceedingly scant; and it ought to be remembered that a good deal of the interest of a local flora consists in its *completeness*—a completeness which, within its narrow local range, ought to be attainable to a high degree.

I have adopted a rough classification of my material suitable to the practical character of the object in view in these notes: mentioning first a few rarities which, as recent additions to the county Flora, I thought members of the club would like to hear of, and which I was unwilling therefore entirely to pass over: going on from them to local plants, the records of which needed amplification or re-examination. Next I have mentioned a number of names recorded in our flora for some years upon evidence more or less doubtful, and requiring therefore verification, at least so far as to determine whether they still exist in old localities. Lastly I have mentioned a few puzzling or critical genera, the forms of which need working out. This classification, it will at once be perceived, is the reverse of scientific—its divisions not even being mutually exclusive; still it was convenient towards lumping together my remarks.

I will only add, that in the case of any and every plant mentioned in the following Notes, dried specimens will be received with thanks, to be incorporated

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in a County Herbarium now being formed as a companion to the flora; and will contribute to render it a collection worthy of the county, and it is hoped really useful as a help to future students of our native plants.

I begin then with a few rarities, which deserve mention as interesting additions to the county flora, but which once mentioned may be dismissed as not needing further investigation.

Meconopsis Cambrica (Welsh Poppy) can now be assigned an undoubted place as a native plant on our extreme western limits. It grows in the Llanthony valley in mountain cliffs at an altitude of from 1,600 to 1,800 feet, in a spot where it cannot well be other than native: and I have now the satisfaction of being able to include the spot where it grows in the Herefordshire flora. It is close upon the Breconshire boundary; still it is within the limit of the Monmouthshire part of the Llanthony valley. A curious point connected with this plant is its occurrence in the parallel Grwyne valley, some three or four miles distant from the undoubtedly native locality, upon rocks and walls by the river side. Had it occurred solely in such situations, one would naturally assume it to be an escape from cultivation in cottage gardens—as is the case so commonly with this plant all through the English Lake district. But considering that it is indubitably native in the same range of hills, and adding the fact that it does not make any appearance in gardens either of the few inhabited or the numerous deserted cottages of this valley, I think its claims to be considered native in the Grwyne valley may be at least admitted, until shown to be in error.

I notice next two Orchidaceous plants which are interesting as additions in the same quarter to the county flora.

One is the rarer of the two Marsh Orchises, *O incarnata.* This had been recorded before for Salop (first on Leighton's authority, and confirmed in the current number of the *Journal of Botany*); but it is decidedly a scarce plant as compared with the more common Marsh Orchis, its census-number in the *London Catalogue of British Plants*, Ed. 7, being 18 as against 80 of the other. It was therefore with pleasure that I found it growing plentifully in a marsh at the bottom of the Grwyne valley, distinguishable at a glance from the more common one by its light *pink* flowers. The other Orchid is a still more unexpected addition to our flora, being *Habenaria albida;* a plant of distinctly northern proclivities, Merioneth and Cardigan being the nearest counties to our own mentioned by Watson in his *Topographical Botany*, and—with the single exception of the isolated county of East Sussex—its most southern limit in Great Britain. Its occurrence therefore within our boundaries is a considerable addition to its range. I had the pleasure of coming upon a single meadow in the Grwyne valley last year in which it was growing in abundance—40 or 50 specimens to be seen in full flower within so many yards.

Still remaining in the same valley, I have next to introduce you to another northern plant, though not so exclusively northern as the last. This is *Geranium sylvaticum.* The history of the find of this plant in the county is curious. Some ten years back, a scrap of it was brought back from this valley by a lady friend of mine. She thought it the common *G. pratense*, and had only picked it for its

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beauty. Moreover one side of the valley belongs to Breconshire; and as she could not recollect the exact spot where it was growing, the admissibility of the plant upon our lists remained undecided. During the same or the following season, I went three times to search for it, but all in vain; neither *pratense* nor *sylvaticum* seemed to exist in the whole valley. Last year I renewed my search; and at last came upon a meadow, the hedges of which for 8 or 10 yards were quite bright with its blossoms—and in Herefordshire. But it seemed, like the *Gymnadenia albida*, confined to a single spot; for not another plant of it did I see during the whole day.

Salix repens has been added to the county lists lately. The only wonder, with regard to this willow, is that it should be so rare as it really appears to be in Herefordshire. I found a few straggling bits last year on the ridge dividing the Cusop from the Craswall valleys. But it was confined to a single spot; and I have never heard of its being found elsewhere in the county.

I now mention one or two grasses which deserve a place in the present paper. One of these, *Anthoxanthum Puellii*, was I fear—whatever may be the case in other counties—with us a mere Casual: and I only mention it because it has appeared of late in the same sort of way in so many counties. It appeared in 1878 in a sandy field in S. Weonard's parish, which had recently been laid down in permanent pasture. But it did not appear again, for I have searched the field every season since without success. Two other grasses have more interest. *Alopecurus fulvus* was first detected in this county by Mr. Purchas in 1875, in King's Capel; and it is to be seen at the same station in certain seasons ever since, but in the most fitful manner, disappearing during some seasons altogether, and in others plentiful, according to no rule that I have succeeded in discovering. Subsequently I found it in Moccas Park; and gathered it again there last year, in company with Sir George Cornewall.

Gastridium lendigerum has still greater interest; Herfordshire being one of the few inland counties in which it is found. But in our county it turns up in so many scattered and unexpected places as to incline the balance of probability decidedly in favour of its being native. First found in 1854 in a recently cut coppice at Wareham, near Hereford, by Mr. E. Davies, I myself subsequently found it at Broomy Rise, in Clehonger parish, in 1875, where a tillage field was literally full of it: again in 1877, in a field near Upton Bishop on the extreme south of the county; and again in 1879 in a recently felled wood at Dinmore, in company with the Club. Members should keep a look out for this grass in other localities, especially in recently cut coppice woods, where it seems to spring up for a year or two after the coppice has been felled.

Last, not least, in this list of rarities, I will place two ferns, forbearing for obvious reasons to say anything exact with respect to their localities. In the Ross district there is a wood which has been long known to contain—for those who knew where to find it—the rare *Lastræa fœnisecii*. I am *not* one of those favoured individuals, and I have repeatedly searched for it in vain. But I was last year fortunate enough to find it in quite another spot, also in the Ross district, where there were several flourishing roots: and better still, in the same

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neighbourhood I came upon a rock covered with the Tunbridge fern (*Hymenophyllum Tunbridgense*). Long may both of these flourish in their secret nooks unharrassed by the knives and spuds of collectors, or worse still hawkers of fern baskets at popular places of resort, for as many ages as have passed since they first began to live their hidden life on Herefordshire rocks and woods!

I class together next certain local plants upon which a good deal of further information is needed, before their distribution in Herefordshire can be said to be adequately known.

Myosurus minimus was first recorded from Herefordshire by Duncomb in 1804. It has been once found since by the Rev. R. Blight, in the neighbourhood of Bredwardine in 1869, and I have not heard of its discovery since. I should be thankful for any further information about this as a Herefordshire plant, especially if accompanied by specimens.

Sagina ciliata would still appear from the records to be of great rarity in Herefordshire. It was first recorded from Coppet Hill, in the Ross district, in 1853, by Mr. Purchas: and not again found until 1875, when it appeared in a clover field in King's Capel. It had probably been introduced with seed in this station, but it was still there in 1878. In 1879 I found it on a wall-top in S. Weonards, where it has appeared in small quantities each year since. Last year I found a specimen or two on Coppet Hill again, verifying Mr. Purchas' old station. It surely ought to be found in other neighbourhoods besides that of Ross, and especially upon the dry slopes and rocks of the Malvern Hills, if the botanists who have an opportunity of minute investigation there would be at pains to distinguish it from the common *S. apetala*, to which it bears so close a resemblance.

Sagina subulata is recorded from dry gravelly spots on the Malvern Hills by Mr. Lees (Malvern Botany); I should be very thankful for specimens, of which I have never seen any. It is unrecorded for any other parts.

Cerastium semidecandrum is quite a rarity. I have specimens of Mr. Purchas' collection from Coppet Hill, and Mr. Lingwood met with it near Mordiford. Mr. Lees reports it from the Malvern Hills; and I notice it in order to request the Malvern botanists to keep a look out for it in their district, within the Herefordshire boundary, and to be kind enough, when it is found, to furnish me with specimens, as it is a little uncertain at present whether Mr. Lees found it in Worcestershire or Herefordshire.

Cerastium tetrandrum. This is still rarer; the only record as yet in the county being an old one of Mr. Purchas (who has kindly given the specimen to the County Herbarium) from rubbish at the lime kilns, Great Doward.

Barbarea intermedia. This rare Winter-cress seems anything but rare in our county. I only learned to distinguish it last year (though the thick short points of its pods distinguish it easily enough from *B. vulgaris*, and their *direction* from *B. præcox*) but I have since found it in at least six localities in the S. Weonards and Ross districts, and in one in the Hereford district. In my own neighbourhood it appears to be the common *field* and *dry land Barbarea*, while *vulgaris* occupies the stream banks, and the rare *stricta*, those of stagnant ditches. I hope botanists will turn their attention to it, in order to settle its real distribution in the county.

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Trifolium filiforme. This was considered by Mr. Purchas one of our greatest rarities; its authority for the county depending solely on a specimen gathered by him at Wilton. Of late years, since learning its distinctive habit and look, I have found it to be really much more frequent. Sellack, S. Weonards, Hentland, Orcop, Whitfield, Breinton, do not exhaust the list of its localities as at present known. It appears especially partial to garden lawns. In Mr. A. Armitage's lawn at Dadnor (and in many others) it forms a good part of the turf. Probably from this we may gather that it bears close shaving better than other clovers, not that it is sold in mixtures for lawn sowing, for it is by no means confined to lawns but is to be found elsewhere, on dry banks and ordinary meadow land. Besides the characteristic *pods*, when ripe, the deeper, more *orange* yellow of its *scattered* flowers, as compared with *T. minus*, attract the eye to it at once when its look is once learned.

Ornithopus perpusillus. This pretty little plant is given by Mr. Lees as "common on the Malvern Hills," and I should be thankful for specimens, with exact localities and dates; since, in every other part of Herefordshire, it is quite rare. I have never picked it in the county, though it is reported from two localities in the Ross district. I possess a specimen gathered by Mr. Crouch on Shobdon Hill; and another by Mr. Burton Watkins on the Little Doward.

Rosa. In this genus, as in the *Brambles*, I must decline to entangle myself in the present paper. But I wish to ask for information accompanied by specimens, with regard to two or three well marked Roses. *Rosa spinosissima* is a common plant in the country lying to the east of Leominster (on Mr. Hutchinson's authority), while absent as far as I know from all the rest of the county. *Rosa Donniana* is reported by Mr. Lees from "the side of a wood near Cradley." *Rosa systyla* reposes on the same great authority, for its station at Cowleigh Park and the "Pye's Nest," Ledbury. I have not seen county specimens of any of the three, and I should be very grateful for their communication by any botanists who have an opportunity of obtaining them this year—more especially in the case of *Donniana* and *systyla*.

Pimpinella magna. The occurrence of this plant in Herefordshire rests on two authorities—one, that of Mr. Lees; the other, a writer in the *New Botanist's Guide*, in 1835. Both locate it "near Cradley," where it therefore ought to be found if looked for.

Geum intermedium. This hybrid is reported by Mr. Lees from the "Upper Sapey brook." It is very rare in Herefordshire, probably because its one parent, *G. rivale*, is so very local a plant with us. But a curious circumstance with regard to it is that last year a large flourishing plant of the hybrid grew in a hedge at S. Weonards, although *G. rivale* has never been known in any part of the south of the county. I can suggest no explanation, unless *G. rivale* had been cultivated in cottage gardens near (though I have never seen it cultivated). I have met with the hybrid, elsewhere in Herefordshire only near Eaton Bishop, where *rivale* and *urbanum* were growing together, the former in profusion.

Epilobium angustifolium, var. *brachycarpum.* Will botanists keep an eye for this marked variety whenever they come across this showy plant? It is clearly

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marked by its short seed vessels and obtuse buds from the ordinary wild form. Its interest consists in the fact that it has been, till lately, only known as a garden plant. But in the Great Doward woods the two forms grow together, clearly both equally native, and it would be desirable to know whether the same is the case elsewhere. The garden plant appears to have larger flowers than the wild one as growing on the Dowards; but I see no other difference. It is desirable to investigate whether intermediates, both in the length of the pods and the shape of the buds, do not occur.

Myriophyllum alterniflorum. This plant is an addition to the County Flora, and it occurs in profusion in the upper course of the Wye, above Hereford. I have it from Breinton, and from Whitney, and Sir G. Cornewall pointed it out to me at Brobury Scaur. I suspect it to have been brought down from the higher Welsh districts of the river; for it does not, that I am aware of, occur in the river in the Ross district, nor in any of the smaller streams of Herefordshire; though its distribution throughout Britain, as traced by Mr. Watson, shows that it is by no means exclusively a hill plant. It would be worth while to investigate its distribution in the Severn, and to search for it in our other streams, distinguishing those which have a high-land origin from those which take their rise in low lands. The high-land Stream moss *Fontinalis squamosa* exhibits almost precisely the same distribution in the Wye as this *Myriophyllum.*

Valeriana officinalis, var. *Mikanii.* I have long looked for this limestone variety of the *Great Wild Valerian* in Herefordshire in vain, but last year I came across a plant looking very like it on Howle Hill; and Mr. J. G. Baker, of the Royal Herbarium, Kew, confirms my suspicions with the verdict—"Certainly *officinalis Mikanii.*" It appears to be almost if not entirely confined to limestone, and on the limestone of the Derbyshire dales it is the more common form. But the Doward Hills do not seem to produce it, and all through the sandstone of Herefordshire, the var. *sambucifolia* seems to occupy the ground alone.

Bartsia odontites, var. *verna.* Extreme forms of this are very unlike the common roadside variety, *serotina.* The name "*verna*" is a little misleading, as leading one to expect a much greater difference in the flowering season as compared to *serotina* than really exists. I do not think that there is really more than three weeks between the two; the common plant beginning to flower about the middle of July, *verna* at the extreme end of June. The upright and compact mode of growth in *verna*, as compared with the straddling *serotina*, gives a better mark of distinction. With regard to the distribution of *B. verna* in Herefordshire, I can only at present say that it is abundant on the Great Doward. It is very desirable to have more observations concerning its distribution over the whole area, and also to notice whether intermediate forms between the two varieties do not occur.

Epipactis media. I once found a single specimen of this plant (in 1866) on the Great Doward. Otherwise not a single record had ever been made of its occurrence in the county until last year, when Mr. Towndrow agreeably surprised me by shewing me specimens from the neighbourhood of Malvern, and assuring me that in that district it is the more common species. It is evident then that we have much yet to learn with regard to its distribution, and I should be much

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obliged to all botanists, especially those of the eastern districts of the county, of which I know very little, for looking at all well-developed Helleborines they meet with this summer, and securing any upon which they can with confidence affix the name of "*media.*" I need not tell any one who has had any experience in them that they are a puzzling family. But any carefully dried specimens will be thankfully received.

Blysmus compressus. This has a wide distribution in Herefordshire, being noted from five districts, in the south, centre, north, and east of the county. I notice it to-day because Mr. Lees states it to be "abundant about springs on the Malvern Hills," and I can only say that in the sole locality in which it is known in the south of the county, Mr. B. Watkins and myself have searched for it for years without once finding a specimen, so rare is it. This only shows how distinct a feature is furnished by the Malvern Hills to the flora of Herefordshire, a remark which is abundantly illustrated in many other instances besides the present; notably by the next plant on my list.

Carex axillaris. This Sedge is quite a rarity in all parts of the county the botany of which I am acquainted with. Eardisland, on the authority of Mr. Crouch, the Canal side near Hereford, on my own authority and that of Mr. B. M. Watkins, exhausted all that was recorded about it till last year: when on the day of the Club expedition to the Herefordshire Beacon, I found it in a wood at the Herefordshire base of the hill; and taking it to compare with some in Mr. Towndrow's collection, he surprised me by assuring me that it was abundant all round the hills. An illustrative series of the plant in question from these parts of the county would form a valuable addition to the County Herbarium.

One more Sedge I must mention here is *Carex distans.* Its occurrence in Herefordshire rests on specimens found by me on the canal bank near Hereford, in 1879, and verified by the authorities of the Botanical Record Club; and on an old specimen of Mr. Purchas' from Plowfield, near Leominster, unnamed by him, but which I think is undoubtedly *distans* also. It is of particular interest, because I believe Herefordshire to be the first county in which it has clearly been met with entirely away from the influence of salt water. Any tall *fulva*-like Sedge in a good state for examination should be picked and cross-questioned by the botanist until it shows satisfactorily whether it is *distans* or no.

I now mention a grass for which I wish to bespeak the attention of botanists —*Bromus asper.*, var. *Benekenii.* Plants under this name were sent up by me to the Exchange Club in 1879, from Broomy Rise in Clehonger parish, and from Downton. The last verdict of the learned, represented by Dr. Boswell, upon them did not point to their being "good" *Benekenii.* I would therefore limit myself to stating that *a* variety of this grass clearly enough separated from the common one to be told at a glance, and always in flower a week or a fortnight earlier than common *asper*, is widely distributed in Herefordshire; and to invite botanists to make notes as to its occurrence in their districts, and collect specimens in order that both its distribution and its proper name may be more accurately fixed.

My next parcel of plants comprises some upon which I possess only scraps of specimens or uncertain records, mostly of some antiquity, the doubts clinging to which need to be cleared up.

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Cardamine amara. A solitary plant of this was found on the banks of the river at Bredwardine Bridge in 1869. This is the sole notice of its occurrence in the county; and the explanation was given that it had been carried down by the river from its higher districts where it might occur more plentifully. But does the plant occur anywhere on the Wye or its tributaries? I have never met with it myself in any part of the Wye valley; nor have I ever heard of its being found in the upper parts of the Wye in Radnorshire or Breconshire.

Viola lutea. Duncomb's list gives this as a Herefordshire plant; but no modern observer seems to have found it within the limits of the county. I cannot give up the belief that it really is a Herefordshire plant; for the districts at the head of the Crasswall and Dore valleys furnish a large expanse of suitable ground for its growth; and I have myself found it within a mile or two of the county boundary on the northern spurs of the Black Mountain: moreover there is a *scrap* under this name in the collection of the late Mr. Davies, and labelled "Black Mountain, Llanthony." Whether picked within our district I am unable to say.

Stellaria nemorum. Sir G. Cornewall has furnished me with a specimen of this from the side of the Wye above Moccas, which I have reason to believe is rightly named. It was found by him in 1862; and as far as I know has not been found since. It is very desirable that the plant should be rediscovered, and something more exact known with regard to its nativity. May it have been a Welsh plant brought down, as in other instances, by the river, from its native Radnorshire haunts?

Callitriche autumnalis. This has been reported from three spots in the west of the county; but I have not been able to obtain specimens; and it is impossible to assign it a place in our flora without the examination of specimens in good fruit.

Myriophyllum verticillatum. This Water-milfoil is plentiful in the canal near Hereford: but two other old localities are recorded for it: one the river Lugg; the other the river Wye between Bredwardine and Moccas. It is the object of the present note to ask for further observations confirmatory of these two. Could it have been mistaken in the last locality for the *alterniflorum* which inhabits this part of the Wye.

Sedum Telephium. This is a very doubtful Native in Herefordshire. It is reported from the border of Lord's Wood, Great Doward, by Mr. Purchas, who, however, seems to suspect that it may have been the remains of cultivation. The same authority states that he once found a specimen in the middle of the Chase Wood, Ross. Mr. Crouch reports it from Pembridge. I have never seen it with any pretensions of being "wild" in Herefordshire.

Lactuca virosa. Two stations are given for this: one a long known one on the Little Doward, where it is undoubtedly wild, and exists still in small quantities. The other, a hedge bank between Hereford and Holmer—an old record on the authority of Mr. Purchas. Was it a native plant there, and is it still to be found?

Salvia Verbenaca. I fear there is no evidence of this being more than an Outcast in our county. A single plant on Howle hill, and another at the "Bar-

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tonsham," Hereford—both quite old records—comprise the whole that is at present known about it as a Herefordshire plant.

Lamium incisum. This also rests upon doubtful evidence. Two old records exist of the plant occurring near Ross: and last year one specimen occurred as a weed in Sellack garden. Here however I believe I had myself introduced it some years before, from Mr. Purchas' garden at Alstonfield, but I do not feel certain.

Orchis ustulata. The evidence for this as a Herefordshire plant is sound and trustworthy as far as it goes; but there sadly needs to be more of it; and assuredly it must be one of our rarest orchids. In 1849 Mr. Wilmot found a single specimen growing in the Wye meadows at the base of Coppet hill. In 1877, I myself found another single specimen in meadows at the base of the Coldwell rocks—this was in Gloucestershire; but only a short distance from Mr. Wilmot's Herefordshire station on the other side of the river. Mr. Lingwood reports the plant from the Woolhope District, but no specimen of it exists in his herbarium. It would be very desirable that the eastern parts of the county should be searched for it.

Kœleria cristata. This grass was discovered upon Bircher Common, near Aymestry, by the Rev. Thos. Hutchinson, in 1860; and the original specimens he most liberally gave me for the County Herbarium. I have not heard of its occurrence since; nor do I know whether it has of late years been searched for at this its only known Herefordshire habitat. I trust that we shall be able to obtain fresh observations this summer to show whether it still grows there, and in what abundance.

The last observations I wish to make in this paper will concern certain puzzling groups, upon which I do not venture to offer any critical remarks, but simply to ask the favour of the communication by brother botanists of well-dried sets for further study.

The first of these groups are the *Capreolate Fumitories.* I do not myself know more than *one*, or at the most *two* members of this group in Herefordshire. The common form is a plant to which I had always attached the name of *Borœi Jord;* but on transmitting specimens to Professor Babington, I was surprised to find some labelled *pallidiflora*, others *muralis.* Other specimens of this common form of ours were labelled "*confusa*" by Dr. Boswell (through the *Botanical Exchange Club*). I am now inclined to believe "*confusa*" is the right name of our common Herefordshire plant; that is of at least 99 out of every 100 Fumitories other than *officinalis*, which grow in Herefordshire. But other forms of this plant certainly *exist* with us. One, evidently different from the common one, Mr. Baker names *muralis* (rightly, I believe). Another, communicated to me by Mr. Purchas, from the neighbourhood of Ross, is, I think, good and undoubted *pallidiflora.* This I have never seen growing in Herefordshire.

A Violet, common with us, next demands notice. The white variety of the common Sweet Violet is, everyone knows, a most happily common plant through the length and breadth of Herefordshire. The blue variety of the same plant seems on the other hand quite rare over the whole county. The Limestone Violet *(V. hirta)* I believe to be quite a local plant with us. It is abundant on

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the Dowards; and in certain parts of the Woolhope District: but I have yet to be convinced that it is ever even *found* on the Sandstone tracts. In its stead there occurs a plant with the bracts, hair, and curved spur of *hirta*, but with the stoles of *odorata*, and with slightly *scented* flowers, which are almost always, if not always, blue. It is to be found in copses, dry or damp, on sandstone, on Woolhope limestone, or on the Mountain limestone of the Dowards; and its flowering period ranges from February to early in May. The first specimen of this I came across was growing in company with a mass of true *V. hirta*, but subsequently I have found it in districts where *hirta* is not known for miles—thus precluding the theory of its hybrid origin. Mr. Archer Briggs gave to some of my specimens the name of "undoubted *permixta*"; Professor Babington was "puzzled," but "inclined to" the same view: I am myself persuaded that some of what we have is true *permixta* (Jord.), but I do not feel sure that we have not got more than one plant in this series. Any creeping luxuriant violet of the *odorata* section which cannot be assigned to *odorata*, deserves attention and observation, if possible under cultivation.

Burdocks. In this troublesome genus I am able, through Mr. J. G. Baker's kindness, to report two additions to our Herefordshire species. The one is an intensely cottony-headed plant, which appears to be Professor Babington's *A. pubens*, and which he (*Man.*, Ed. 7, p. 197) asserts to be synonymous with Lange's *intermedium*, though it differs much from specimens received through the Exchange Club, and gathered at Copenhagen in company Prof. Lange himself. The other is *A. nemorosum*, *Lej.*, to which species Mr. Baker doubtfully assigns plants of Mr. B. M. Watkins' and my own, gathered in two separate localities in the Ross district.

There remain to mention two groups of Sedges upon the forms of which inhabiting our county information is much wanted. These are the Sedges of the *fulva* and the *flava* groups. Have we one, or more than one, plant belonging to each of these, in our area? In answer to this question, I believe that I can now affirm that we have at least *two* distinguishable plants belonging to each of these two groups. To take *Carex flava* first, I had long thought the variety *lepidocarpa* to be far the most common, if not the sole, representative of *C. flava* in Herefordshire. But an examination of a number of specimens, chiefly from the south and west of the county, has persuaded me that we have the true *flava* from at least two or three localities. The most characteristic are from a small boggy copse at Breinton, near Hereford; but others from the Ffwddog, and from the neighbourhood of Tram Inn, are I think rather this than *lepidocarpa*. The third segregate of this sedge, *C. œderi*, of Ehrhardt, I have never found in Herefordshire, nor indeed myself anywhere away from the influence of the sea. Of this group, therefore, *C. lepidocarpa* remains still (as far as my knowledge goes) for the most prevalent; *flava* is sparingly but widely found; *œderi*, *Ehr.*, is a desideratum. Series of this plant, especially if exhibiting very small neat fruit, or on the other hand, unusually large fruit with hooked beak, would be very valuable, especially from the east of the county, from which I have not a single specimen. Upon *Carex fulva*, few words will suffice. Dr. Boswell (*English Botany*, Ed. iii.) divides it into

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three segregates—a type *fulva;* a var. *b. Hornschiana*; and a var. *c. sterilis*. Between *fulva* and *Hornschiana* I think it is useless to try to find any distinction. We have the plant in aggregate widely distributed though not abundant, and plants from the same locality have been variously named at different times by the authorities, with these two names. But last year I found, at two spots in the Black Mountain district—one within our area, the other just in Breconshire—a plant decidedly and at once distinct from our common one, by its tufted root-stock showing abundance of herbage of a much lighter green. The flowering stems were correspondingly sparingly developed; and the fruit, though in August, not well formed. But all the characters agreed with the hybrid plant placed by Dr. Boswell as var. *c.* under *C. fulva*. Its position also where I found it, among both *fulva* and *flava*, its abundant herbage, and undeveloped fructification, pointed to its being a hybrid between these two plants. *C. xanthocarpa*, described by Mr. Pryor (*Journ. of Bot.*, 1876, p. 365) is considered as a synonym with this hybrid; and with Mr. Pryor's description our plant agrees in all respects. The rough beak of the fruit, and the absence of the conspicuous white membrane on its inner edges, so characteristic of ordinary *fulva*, was even more marked than in specimens received from the locality from which Mr. Pryor describes the plant.

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Woolhope Naturalists' Field Club.

JUNE 17TH, 1881.

WIGMORE CASTLE AND THE MORTIMERS.

THE following paper on "Wigmore Castle and the Mortimers," was read by the Rev. James Davies, of Moor Court, Kington, at the meeting of the Woolhope Field Club, held on June 17th. The paper was read at the Castle, and was listened to with much interest by the members :—

One of the grand and vaunting stories of historic and heroic Herefordshire, is that of Wigmore and her lords. From my boyhood I remember how, at a country theatre on the border, I used to listen, attracted and entranced, to "Mortimer of Wigmore, a legend of Herefordshire," performed nightly by a company of strollers, from no visible manuscript, but a hazy transcript which was, I suppose, somewhere in existence lying "perdu." I recollect that the young Prince, who whilom made the wonderful escape from durance at Hereford, was nightly precipitated from the heights of Wigmore Castle by the powerful Baron of Wigmore, but my connection of history is insufficient to serve me in point of date or particulars. I conclude that the battle of Evesham must have come after and settled matters satisfactorily for the powerful family which occupies so distinguished a place in the annals of English history, and ultimately obtained the Crown in the person of Edward IV. One thing I cannot doubt that this theatrical reminiscence, which must have been kept alive in many memories besides mine, may even yet cling to many, and that we are all the more fascinated to hunt up kindred stories of old memorial, and to revive fondly the vestiges of the past (the footsteps of the Mortimers, whether across the border in Radnorshire, where the name of Mortimer was powerful and predominant, or in this their central home and source-place of power, wherein we are this morning met). I purpose to gather from the help afforded by such authorities as the *Castles of Herefordshire*, by Mr. C. J. Robinson, a former president; "a learned paper" of Mr. G. T. Clark, of Dowlais, the eminent exponent of English castle building; and such notes as have been stored up in the *Quarterly Review's* "Article on Herefordshire" in 1879, and its complement, Mr. Murray's *Handbook to Herefordshire, Worcestershire, and Gloucestershire*, for an (I hope) intelligible account of Wigmore Castle's early history and superstructures, a passing sketch of the chief Mortimers of history with whom we are concerned, and such other general remarks as are perhaps not out of keeping with the "genius loci." I am duly mindful that a little further on—at the Chapel Farm and the Mistletoe Oak—I am to divest myself of the teacher's office, and listen once more to the Archdruid himself of our Club, as he shears the mystic branch of the mistletoe,

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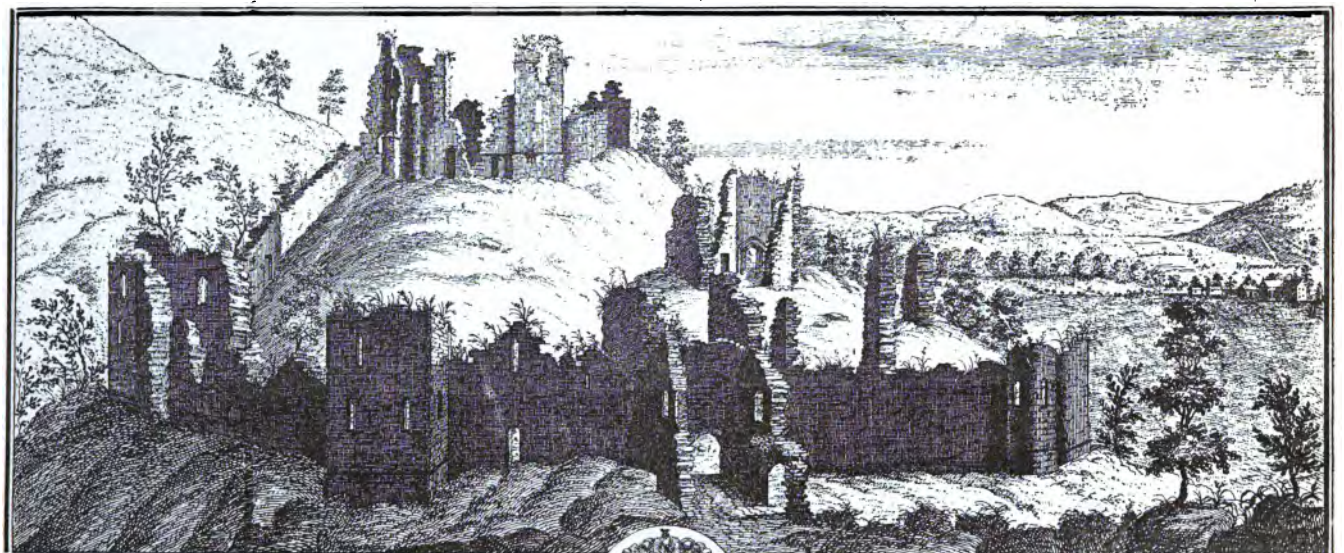
THE SOUTH-VIEW OF WIGMORE-CASTLE, IN THE COUNTY OF HEREFORD.



To the Right Hon.ble EDWARD Earl of Oxford and Mortimer & Baron Harley of Wigmore: Owner of this Castle. This Prospect is Humbly Inscribed by.

My Lord.

Your Lordships most Obed.t & Obliged Serv.ts

Sam.l & Nath.l Buck.

THIS CASTLE was built by W.m Fitz Osborn Earl of Hereford & Lord of Wight but y.e Ground belong'd at that time with y.e Manoir to Randulph or Ralph de Mortuo Mari or Mortimer one of K.W.m C. Captains & Knights who came from Normandy with him Hugh de Mortimer his Son founded & endow'd the Adjacent Priory about the Year 1179. In the absence of Ralph the Grandson of Hugh, this was plunder'd by the Welsh & most of the Building burnt, except the Church but it was again restor'd by the Family. The Mortimers of Wigmore were of great Dignity and distinction. Edmund de Mortimer Earl of March married Philippa only Daughter & heir of Lionel Duke of Clarence 2 Son of K. Ed. III after which he was Lord Lieutenant of Ireland where he died his Body was brought over & buried in the Church of this Monastery. It came thus into y.e Crown by whom it was in process of time given to y.e Noble Family of Harley who are Barons of Wigmore Earls of Oxford and Mortimer.

Sam.l & Nath.l Buck Bern. et Sculp. 1732

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with golden sickle or forceps, and introduces the fortunate pilgrims of Deerfold Forest to the Lollards in Herefordshire and the Asarabacca plant. And so I plunge into my task with a view of despatch.

The castle and chief stronghold of the Wigmores stands in the north-west corner of the border shire of Hereford, eight miles on the English side of Offa's Dyke, one of a chain of strongholds of which Clun, Hopton, Brampton Bryan lay to the due north, Lingen and Lyonshall to south, while in its rear were posted Croft and Richard's Castle, assuring the garrison speedy communication with Ludlow and Shrewsbury. The church, formerly attached to the once wealthy abbey founded for monks of the order of St. Austin, is a Romanesque building with an addition standing on the pinnacle of a hill, close to a precipice whose chasms are filled by great trees. It exhibits some herring-bone masonry with curious stall wood-work inside. The Grange and Abbey of Wigmore lie a mile or so to the north of the old town and castle. (See more at p. 8, *Shropshire Handbook.*)

The castle above the town stands on a very commanding eminence, above the church and beyond it, between which and it runs what was once "a wet ditch." To the west it is commanded by a still higher hill, but north and north-east the outer walls crown precipitous and briary heights, and overlook (as from an eyrie) the broad rich meadow lands of Adforton, Letton, Brampton, and Leintwardine, making it an almost impregnable stronghold by the help of art and nature. High over all to the north-east was the square Norman keep, with its projecting buttress towers, below which, connected with it by a strong battlemented wall, were the apartments of the castle in a quadrangle, and at the foot of the hill, a second and perhaps later wall. In the lower part is the great gateway, surrounded with a lofty curtain protected by square and round bastions. Outside the castle, and separated by a gorge, appears to have been a protective barbican, as well as strong embankments, sloping towards the moor beneath. The entrance gateway of the 14th century is still tolerably perfect, and was reached by a drawbridge. That such an outlook should have been early secured is easy to understand, yet from the account in Domesday it seems to have been waste land in Saxon times, and only built upon by Earl William Fitz-Osborn on waste land called Moreston, which belonged to Gunneret, in King Edward's time. It is inferrible that between 1072 and 1085, Edric Silvaticus forsook allegiance to King William: that William Fitz-Osborn, Earl of Hereford, being then dead, Ralph Mortimer, son of Roger Mortimer, the conqueror's kinsman who fought at Hanley, was deputed to reduce Edric, and having succeeded in doing so, was rewarded with many of the estates of Edric, and that he became Lord of Wigmore in 1074, in virtue of being the King's principal lieutenant in Herefordshire. Mr. G. T. Clark judges that when the original fortress was founded is unknown, though there certainly was a mound here before the time of Edward the Elder, who is recorded to have repaired Wigmore.' He holds that a Norman lord, at the end of 11th or beginning of 12th century, first superseded (as elsewhere) the timber walls or palisades of the English keep, by a polygonal keep, and the curtain walls of the inner ward. Much of the extant masonry, with the exception of the Norman shell, keep, and wall, is of decorated date, mostly

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built originally on the Norman outlines. In the early 14th century the whole was probably restored in a complete and solid fashion.

So far as he goes, the veteran historian of the civil wars (the late Rev. John Webb, of Hardwick, and his son, Thomas William Webb) contributed no small help to the veritable data of Wigmore's early tradition. It is well known that, in some way or other, one volume of Blount's (of Orleton) MS *History of Herefordshire* (that which begins with the letter L) has alone survived. The first volume, according to the testimony of Blount's grandson, was lent to a Herefordshire gentleman, and should be retrievable, but is not. However, the elder Mr. Webb had the good fortune, in the course of his long life, to get access to a transcript of this first volume, in, apparently, a child's handwriting, and full of inaccuracy in names and dates, but still of use and interest in default of better authority. In this, through the kindness of the Rev. T. W. Webb, of Hardwick, I have been allowed a careful research; and naturally looked to see what Blount, a scholar of profounder research than any of his contemporaries in North Herefordshire, had to say about Wigmore and its lords. His words, under the head—"Wigmore Town and Castle," are as follows, and may be interesting:—

"This town is of great antiquity, for we find it was repaired in the time of "Edward the Elder, before the Conquest, by the name of 'Wiggen yn mere,' and "was then reputed a city, and after fortified with a strong castle by William, Earl "of Hereford. The name seems to be Saxon, in which language 'Wiggen,' or "'Wiggend,' seems to signify warrior—'ga' or 'to go' and 'Mere' a pool or "great water; for it is supposed that rich ground below the town now called "Wigmore was held heretofore to be undrainable. It is held one of the ancientist "honours in England, and has twenty-one townships or manors that owe suit to "the Honour Court, and all the land wherein these manors lie is called Wigmere "Land, which has two high constables, and gives name to the whole Hundred. "The Abbey was founded by Hugh Mortimer, in the time of King Stephen, and "had very great possessions granted to it from time to time by that noble family. "These Mortimers had great privileges, and even some regalia, granted by our "Kings to the Honour of Wigmore, as well of life and death as of other im-"munities."

The ruins of Wigmore Castle are extensive, and well represented in Mr. Robinson's bird's-eye view. The keep is in ordinary Norman style, massive and square, with slightly projecting buttresses at each corner. The entrance gateway is on the south of the castle, and the most perfect part of the castle yet extant. In the right tower, access was gained by a newel staircase to the porter's room, from which the portcullis was worked, as, if I recollect right, at Wilton and Goodrich. The rugged precipitous nature of the ground to west and north was in itself a protection, but the process of dismantling, which the fortress suffered in 1648, has destroyed most of its ancient features. According to a letter of Lady B. Harley, there was talk of sending soldiers into Wigmore in that year, but as Colonel Massey could not spare men or ammunition, it was thought most prudent to dismantle it. Certain it is that a baffled attempt was made, after the siege, to plant a garrison at Wigmore, slighted in a military sense by Robert Harley at the

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breaking out of the war. "The incredible tradition, still firmly adhered to "(writes Mr. Webb, Vol. 1, p. 321) by the inhabitants of Wigmore, that the fort- "ress was battered down from the too-distant height of Croft Ambrey, may have "had its origin in the part that the owner of Croft Castle might have taken to "annihilate the last attempt to render Wigmore Castle a post of military occupa- "tion. Pitched midway up, on a romantic chine of rock, on the lower point of "which stand the church and straggling village, it is severed from the upper por- "tion of the ridge by an apparently artificial escarpment available only against "the missiles of earlier times; but since it might evidently be commanded from "above, the Castle of Wigmore, as a hold against modern artillery was (would "be) of no account."

And now to recall out of the dim past some of the mighty chiefs who erewhile made these courts re-echo with the tramp of war. The first English Mortimer, Ralph, died seized of above 130 manors, of which 69 lay in Hereford and Salop. He was succeeded at Wigmore by his eldest son, Hugh, who opposed the accession of Henry II., and fortified Wigmore, Bridgnorth, and Cleobury Castles against the King. Brought to terms by Henry II., Hugh had to surrender Wigmore Castle to the King, and died there, 1185, in penitence, as a Canon of the Abbey, having much confirmed and augmented his father's grants thereto. It is to him that the weight of authority attributes the Norman work traceable around the outer ward of Wigmore. He is also credited with having built several castles in South Wales. Roger, his son, seems to have found full employment in keeping down the Welsh, and, dying in 1215, was succeeded by his son Hugh—Hugh, the fourth lord, and heir to King John. In his time Llewellyn attended a conference at Wigmore. He held for the King the castles of Stratton-Dale and Holgate, in Salop; and, dying from wounds received in a tournament, 1227, was succeeded by his brother Ralph, the fifth baron. He flourished in the first part of Henry III.'s reign, and was very turbulent on the Marches. In Melenydd, which seems to have represented pretty much Radnorshire and Brecknockshire, he built the castles of Keventles and Knoclas (Covenllys and Knucklas) and strengthened his social strength by marrying the daughter of Llewelyn, and widow of Reginald de Braose, dark Gladys. He died 1246. Roger, sixth lord, his son, took a fluctuating lead in Welsh affairs, in which Llewelyn took four of his castles—Melenydd, Keventles, Radnor, and another. He adhered to Henry, fought at Northampton, and had to flee from Lewes. He aided, as all know, Prince Edward's flight from Hereford, bringing him, in concert with the Lord of Croft, with fleet steeds to Dinmore, and thence, by relays, to Wigmore. He had a command at Evesham, and for his services received the Earldom of Oxford, opposing on that account the restoration proposed by the Dictum of Kenilworth. It was he who at that castle held the famous tournament in honour of which the Great Gate House there gained its name of Mortimer Tower. Chronicles distinguish the military pageant as the round table of 100 knights, and as many ladies. This Roger has been supposed to be a great re-builder of Wigmore Castle, though the work now seen seems of slightly later date. He died 1282-3, and was buried at Wigmore. His eldest surviving son, Edmund, succeeded, and is famous for his attack on the Welsh at

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Builth, and transmission of Llewelyn's head to the King. As he was "suspect" on the score of his Welsh lineage, he was very busy in quelling the outbreaks after the event, and in putting down one of these at Builth, in 1303-4, he got the death wound of which he died soon after at Wigmore.

Roger, eighth lord, styled Lord Mortimer of Wigmore, and created Earl of March in 1328, served both in Scotland and Ireland, was governor of Builth Castle, took Cardiff from Hugh Le Dispenser, and had a grant of Clun. He joined Thomas of Lancaster's party against Edward II., had a narrow escape for his life while in prison, and in gratitude built St. Peter's Chapel, in the outer ward of Ludlow Castle. In 1322, after the battle of Boroughbridge, he fled to France, and the King seizing Wigmore caused an inventory of its contents to be made by the keeper, John de Cherleton. This comprehends springholds, the artillery of the age, cross-bows, English and oriental armour and weapons, a chess board, and a board for tables and draughts, five peacocks in courtyard, and grain and cattle in quantity. On the Earl's return followed his guilty ascendancy with the She Wolf of France, his acquisition of endless manors in England, Wales, and Ireland, his seizure in Nottingham Castle, his attainder, and hanging in 1330. He it was who apparently superseded the Norman work of Wigmore Castle in the decorated style yet remaining. Edmund, his dispossessed son, died within a few months a minor. But Roger, the tenth lord, succeeded him, and had the living of the Castle of Wigmore before he came of age. He procured the reversal of the attainder and the restoration of the Earldom of March in 1352. Serving Edward III. in France, he received much Welsh property, and added to it Ludlow and other estates, through his mother, the heiress of Genville, and finally died in 1360, commander of the English forces in Burgundy.

Edmund, eleventh Lord, and third Earl of March succeeded, whose abilities were turned, while under age, to account in negociating a peace with France, and later, as Lieutenant of Ireland. Marrying Philippa, the heiress of Lionel, Duke of Clarence, he maintained the ancient honour and influence of his name. He died at Cork in 1381.

His eldest son, Roger, became fourth Earl of March. He was, by Richard II., made Lieutenant of Ireland, and by descent from the Duke of Clarence declared heir to the Crown. His services were exclusively in Ireland, where he was slain. He was followed by his son, Edmund, the fifth and last Earl of March, who, during Henry IV.'s reign, was regarded with a jealous eye by that monarch, and kept under surveillance. Henry V., however, employed him in Normandy, and in the next reign he became Lieutenant of Ireland. He died in 1425, aged 24, and with him the male line of Mortimer ended. Among his castles in the Marches were returned at his death, Builth, Clifford, Dinas by Talgarth, Dolvern, Denbigh, Kevenles, Ludlow, Montgomery, Norton, Narbeth, Raidrey, Radnor, Usk, and Wigmore. Richard, Duke of York, as his sister's son, transmitted the vast estates of the Mortimers to his son, Edward IV., when all became merged in the Crown. From the Honour of Wigmore, Edward raised most of the forces wherewith to defeat Owen Tudor, at no great distance from the castle, and nearer still to Mortimer's Cross. The castle remained in possession of the Crown till

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granted away by Elizabeth. In 1601 it was purchased by Richard Harley; in 1643 dismantled by the Parliamentarians. It descended amidst divers vicissitudes to the Lady Langdale, whose heir is R. D. Harley, Esq., of Brampton Bryan.

As the thoughtful and sometimes eloquent historian of the Civil War concludes his notice of the castle in this connection, so may we be allowed to do. "Even in the days of Elizabeth it was falling to decay, but its massy fragments "are slow to yield. Fifty years have made very little alteration in these remains, "which stoutly resist the siege of time; and as in the sunset of an autumnal "evening, it flings the broad shadows of its desolate towers across the valley up "to Bringwood Chase and the borders of the county which it once protected, it "exhibits to the traveller no faint or feeble emblem of the departed grandeur of "those chieftains who, with their retainers, once occupied its courts and cham-"bers, and, except that they have given their deeds to history, and a portion of "their blood to the blood royal of England, have left nothing behind them but "the name of Mortimer." (p. 321.)

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JOINT MEETING OF THE

Woolhope and Caradoc Field Clubs.

JUNE 17TH, 1881.

INTERESTING PAPERS BY DR. BULL, OF HEREFORD.

ON June 17th, the Woolhope Naturalists' Field Club met the Caradoc Field Club in Deerfold Forest, when Dr. Bull, of the former Club, read the subjoined interesting and able papers, which he had specially written for the Caradoc meeting.

WILLIAM SWYNDERBY AND THE LOLLARDS IN HEREFORDSHIRE.*

Five hundred years ago the forest of Deerfold—about the centre of which we are now placed—was a wild and desolate region—surrounded as it was by the extensive chases of Bringewood, Prestwood, and Moctree, and by a succession of wooded hills on every side, all equally uncultivated; it might, with some justice, be called a natural sylvan fortress. It had no roads, and the sharp declivities of its high grounds, the deep ravine of the Dirkendale brook, boggy and marshy wherever its banks were flat, made it almost unapproachable. It was, indeed, this extensive tract of difficult and unknown forest land which enabled Edric, the Earl of Shrewsbury, "Edric Sylvaticus" the forester, to maintain the Saxon cause for many years after the Norman conquest in England. Edric, as we know, subsequently swore allegiance to King William, but owing to some offence given to him by the King, he revolted, c. 1072. Ralph de Mortimer was then deputed to reduce him, and having done so, with considerable difficulty, he was rewarded by William with a large share of Earl Edric's possessions, including the forest of Deerfold. At the time of the Domesday survey (1085) the whole district was little more than a wild chase, and was otherwise wholly unproductive. It is there stated, with regard to it, "*In his vastis terris excreverunt silvæ, in quibus iste Osbernus venationem exercet, et inde habet quod capere potest, nil aliud.*" This Osborn was Osborn Fitz-Richards, the Lord of Richards Castle and Ludford, who was associated with Ralph de Mortimer in the overthrow of Earl Edric. We may thus be sure that he did not lightly get the right of sporting over the forest; though he only got from it, as the survey says, "what he could catch and nothing more."

Five hundred years ago, that is after the lapse of three centuries, the char-

*This paper, although originally read before the Club by Dr. Bull in 1869—(see *Transactions* for that year, page 164, et seq.)—is again introduced here in abridged form, not only as a revised edition, but also for the benefit of those members of the Club who have not in their library a copy of the Volume for 1869.

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acter of the district was but little changed. The Forest of Deerfold had become a sort of outer park or hunting ground to Wigmore Castle, and still retained its wild and natural aspect; its woods were valueless, its marshes undrained, and its grounds uncultivated. Trackings were made through it for the convenience of hunters, and verderers' huts were to be found here and there. The chief verderer most probably built and occupied the house, which was soon known as the "Haven;" a refuge from bad weather, the trysting place for mid-day refreshments, and a hospitable refuge, perchance, for the lost and weary traveller. It says something for the zeal of the church in those days, that a small church had been erected in the seclusion of the forest, at which a priest attended at certain periods of the year to perform religious services for the benefit of the scattered people in the district, and for the nuns of the Priory and Convent of Lyngebrook. Five hundred years ago, less only by nine, that is in the year 1390, the Forest of Deerfold afforded a refuge to William Swynderby and some companions, followers of Wycliffe, who came here to avoid the violent persecution which set in against them on the death of John of Gaunt in 1389. It is highly probable that the very great seclusion of the Forest of Deerfold was pointed out to Swynderby by Sir John Oldcastle, Lord Cobham. He knew the district well, and could obtain for him not only the protection of Roger Mortimer, Earl of March, who was at this time Lord of Wigmore and the Forest of Deerfold, but also of many other leading people. There can be little doubt but that he maintained Swynderby during his residence here, since it was one of the charges against that great and good man that he supported Lollard preachers at this time in the Diocese of London, Rochester, and Hereford.

There is but little known as to the life of William de Swynderby, or William Swynderby. He first comes into notice as a priest in Leicestershire, and the earliest and fullest account of him is given in the chronicles of his contemporary, Henry of Knighton, a canon of Leicester Abbey. Knighton wrote in direct opposition to the views of the Wycliffites, and his chronicles cannot be expected therefore to show them any favour. Swynderby was a man of good abilities and highly educated, probably at Oxford, and he was a disciple and personal friend of Wycliffe, and one of his company of "poor priests." He was a gentleman, for he attracted many learned and able men, and kept them in close companionship with him for long periods of time. He seems to have gone to Leicester in a missionary spirit, without any cure of souls or other church appointment, and was allowed to reside in the Abbey for a time. He preached in the Chapel of St. John Baptist, without Leicester, near the Leper's Hospital; and in the churches of St. Martin and St. Margaret, in that town. He did not remain long an inmate of the Abbey, most probably on account of the very decided manner in which he adopted and preached the new views for the reformation of the Church.

He is next heard of as one of the many of Wycliffe's "poor priests," who received the protection of the Duke of Lancaster, John of Gaunt; and he lived for several years as a recluse in his park near Leicester. Here he lived a life of great sanctity and self-denial, "refusing the gifts and presents," says Knighton, "which were sent him by some devout people of Leicester," and hence he became

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known as "William the Hermit." He continued, however, constantly to preach the Gospel, "running sometimes into the town and sometimes going into the country."

Swynderby was gifted with a good voice and great natural eloquence. He was simple and unaffected in manner, earnest and persuasive. He knew by heart much of the Bible in the vulgar tongue, and was very ready in quoting it. He was withal so strict and austere in his own life as to bear out his teaching, and quickly gain for himself considerable influence. Wherever he preached crowds flocked to hear him, whether in the street or in the market place, like the mendicant friars of that period; or in the churches of Leicester, and the neighbouring towns which seem at this time to have been open to him. "By his preaching," says Knighton (fol. 2667), "he so captivated the affections of the people, that "they said they had never seen nor heard any one who so well explained the "Truth to them; and so they reverenced him as another God."

Swynderby preached simply with great boldness and simplicity, and yet with a considerable amount of tact and caution. Avoiding the more dangerous topics, he preached against the vanity and pride of the people, against the luxuries and vices of the rich, and denounced openly those sins of the priesthood and the church, which, though but too common at the time, were yet too gross to be capable of defence. "He so provoked the women," says Knighton, "that the "good and grave women, as well as the bad, proposed to stone him out of the "place; and but for the Divine clemency he had driven some honest men of the "town into despair." His preaching certainly made a very great impression on the people, and it was probably due, in great measure, to Swynderby's eloquence that "the Reformer's sect," as the chronicle states "was held in the highest "honour in those days, and was become so numerous that you could scarcely see "two persons in the highway, but one of them was a disciple of Wycliffe." —Knighton, fol. 2665.

In the preface to the edition of *The Bible of Wycliffe and his Followers*, by Forshall and Maddus, published at the Oxford University Press, in 1850, Swynderby is named as one of the principal associates (with Hereford, Ashton, and Parker) of Purvey in the preparations of the edition of the Bible, which has Purvey's General Prologue; and it was probably during his residence in the park at Leicester, that Swynderby was engaged upon it.

He is next heard of in a mandate issued by the Bishop of Worcester (Wakefield) against the preaching of Lollards in his diocese, dated August 10th, 1387. The mandate also names Hereford, Ashton, duo, Purvey, Parker, and Swynderby, as leagued together in an unlicensed college, "*insanâ mentis perducti, ac suæ* "*salutis immemores, sub magnæ sanctitatis velamine, venenum sub labris, in ore* "*mellifluo habentes, zizanium pro frumento seminantes*," &c., &c. (Reg. Wakefield Wigorn, fol. 128; Wilkins III., p. 202.)

On the death of John of Gaunt in 1389, an active persecution of the Lollards was at once commenced. Richard II. issued a commission against the inhabitants of Leicester, and Archbishop Arundel made a visitation there, summoned some of the leading inhabitants before him, and excommunicated them from the high

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altar of the Abbey Church. Swynderby was in Leicester at this time, and did not escape. On the representation of Friar Frisby (an Observant), Friar Hincaley (an Augustine), and Thomas Blaxton (a Dominican), he was cited to appear before John Bokynham, Bishop of Lincoln, in the Cathedral Church of that city, to answer certain articles drawn up against him. These articles were eleven in number, and were chiefly directed against his attacks on the priests and the Church. Swynderby's caution, however, had been so great that his accusers preferred to invent charges against him rather than to bring forward the true ones. In his letter to the Bishop of Hereford (Reg. Trefnant) he makes his defence, and says that "at the instance of the Friars he was compelled to revoke conclusions that he "had never held." Knighton gives the result of Swynderby's examination before the Bishop of Lincoln, as follows:—"At length he was publickly convicted of "divers heresies and errors, and deserved to have made fuel for the fire. Then "did his followers lament, and strike their hands and heads against the walls, "making a mourneful noise. For a great many of the town of Leicester accom-"panied him every time, to give him their assistance; but all was to no purpose. "But, by chance, the pious Duke of Lancaster was at Lincoln the same day, who "was always ready to assist all the Lollards, for he believed them to be holy men "of God, on account of their fair speeches and assurance, although he was "deceived as well as many others. He interposed with the Bishop in behalf of "Swynderby, and the Bishop yielded to the Duke's request, and let him off on "condition of his making a retractation" in several churches named. (Knighton, fol. 2,671).

Walsingham says:—"When the Bishop of Lincoln had made preparations "to correct this man, the mad multitude raged in such a manner as frightened the "Bishop, and deterred him from proceeding against him." (Hist. Aug., p. 284).

Swynderby left Liecestershire as soon as possible after his narrow escape, and he is next heard of at Monmouth, then in the diocese of Hereford. John of Gaunt held the castle at Monmouth, and Swynderby had very probably visited the town before and made friends there. The Friars, however, soon followed him up. Copies of the proceedings at Lincoln were sent down to the Bishop of Hereford, who forthwith issued a monitory letter, inhibiting anyone to preach in his diocese without license. This inhibition was personally served upon Swynderby, at Monmouth, early in the year 1390.

The greatest tribute paid to the eloquence and successful preaching of Swynderby consists in a special inhibition issued against him by Archbishop Courtney. It is entitled "An Inhibition of the Archbishop of Canterbury, lest "any one should presume to listen to the preaching of William Swynderbye," &c., &c., and threatens all who do so with the penalty of "the Greater Excommunication"; given "at our Manor of Maghfield, May 18, 1391." (Reg. Courtney, fol. 338a; Wilkins IV., p. 215.) This inhibition affords direct inference that Swynderby was considered at that time the leading preacher of the Lollards.

Swynderby is next mentioned as preaching at Whitney on Monday, August 1, 1390, and by that time he had probably taken up his residence in Deerfold Forest. The following year, on June 14, 1391, by the introduction of some in-

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fluential friends, and under their protection, he met the Bishop of Hereford (Trefnant) at Kington, in the parish church, without any formal citation. This interview seems to have been friendly, and Swynderby agreed to attend again before him—to use the Bishop's words as translated from the Episcopal Register —"at a day and place for him meet and convenient, of his own choice and free "will; that is to say on Friday, being the last day of the same month of June "next following, assigned to him at the church of Bodenham of the same our "diocese, to answer certain cases and articles exhibited to us by many of Christ's "faithful people, zealous followers of the Catholic faith."

These articles were 17 in number, and besides the general charges of heresy and schism against him—his attacks on the sins and wicked practices of the priests, auricular confession, limiting the usurped power of the Pope, and preaching without license—they included also his disbelief in the doctrine of transubstantiation, which it is remarkable had not been alluded to at Lincoln, and then come the two last charges which refer to Deerfold Forest and its neighbourhood, viz. :—"XVI. Item. That the same William, unmindful of his own salvation, "hath many and oftentimes come into a certain desert wood, called Dervolds-"wood, of your diocese, and then in a certain chapel not hallowed, or rather in a "profane cottage, hath, in contempt of the Keys, presumed of his own rashness "to celebrate, nay rather to profanate. XVII. Item. The same William hath "also presumed to do such things in a certain profane chapel, being situate in the "park of Newton, neigh to the town of Leintwarden, of the same your diocese." *(Trans. from Bishop Trefnant's Register.)*

A copy of these articles was sent to Swynderby who drew up "a protestation with his answers to the articles" at considerable length. The statement is very characteristic of himself. It is written simply, but with considerable ability, and with a constant reference to Scripture throughout. He maintains his opinions with great boldness, and yet with much greater tact and caution than appears on the surface, nor does he hesitate to meet his accusers on their own ground by the introduction of a little evasion and special pleading, when it suits his purpose to make use of either. His caution is very clearly shown by his passing over without notice the articles VI. and VII., which charge him distinctly with holding the heretical opinions of the doctrine of transubstantiation, and thus he avoids the point which afterwards brought so many of the Lollards to the stake.

Swynderby attended personally at Bodenham on the day appointed "about six of the clock," and met there the Bishops and Canons from Hereford. He read his Protest and Answers to the Articles "before all the multitude of faithful Christian people." They were by no means satisfactory. The Bishop evidently felt he had been taken at an unfair advantage. He had not sufficiently appreciated Swynderby's eloquence. He had summoned a large congregation and come prepared to hear a retractation, but instead of this he had to listen in state to the defence of the Lollard doctrines by their most eloquent advocate. The Bishop did not like it, and in the Report in the Register he goes on to say, with careful precision—"Which thing being done, the same William (without any more with him) did "depart from our presence, because that we, at the instance of certain noble per-

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sonages, had promised to the same William free access; that is to wit on that "day for the free exhibiting of these answers, and also free departing, without "prefixing of any term, or without citation, or else any other offence or harm in "body or in goods."

The Bishop, however, lost but little time in preparing a formal citation for him. Five days after, one was issued "from our house at Whitborn," dated July 5th, 1391. "And because," says the Bishop, "the said Wm. Swynderby conceals "himself, and cannot be served personally with it, we have caused him to be "publickly cited in the places where the said William has been accustomed to "officiate." It is therefore addressed "To his dear son our Dean of Leamster, to "the parsons of Croft, Almaley, and Whitney, and also to the vicars of Kington, "Eardersly, Wiggemore, Monmouth, Clifford, and St. John's Altar, in our "Cathedral Church of Hereford" charging them "to cite or cause to be cited "peremptorily, under pain of excommunication, William Swynderby, pretending "himself to be a priest," &c., &c., "to appear at North Ledebury, on the 20th of "this present month of July." (Reg. Trefnant.) Swynderby heard of it quickly, and sent a servant with "a certain schedule of paper made like an indenture to "excuse him." He was then ordered to appear on the 29th of July, at Ponsley, or Pontesbury. He did not appear there, and was pronounced "Obstinate," and the 8th of August was appointed for him to appear at Cleobury Mortemere. He was publickly called for in vain here, and was then ordered to appear August 16th, in the parish church of Whitborn. He did not appear, and then was read out the process against Swynderby sent from Lincoln, and witnesses were examined as to his proceedings in the diocese of Hereford, and on the 2nd of September, 1391, he was formally excommunicated, and the faithful forbidden "to believe, receive, "defend, or favour the said William, under pain of the law."

Against this decision Swynderby made a long appeal to the King and his Council, "for the King's Court in such matter," he says with some policy, "is "above the Bishop's Court." He contrasts "Christ's law" with the "Pope's law," and adds that "if the Bishop or any man couthe showe me by God's law that my "conclusions and mine answers were error, or heresie, I would amendet and "openlie revowe yem before all ye peepple." He also addresses a long letter to the nobles and burgesses, and both the appeal and address are copied at full length in the Ecclesiastical Register.

Swynderby did not live as a recluse in the Forest of Deerfold. He brought with him or was quickly joined by several companions, some of them able and learned men. The names of Walter Brut and Stephen Bell are made known to us by the record in the Ecclesiastical Register of the proceedings taken against them, but "others" are several times referred to.

Walter Brut was a graduate of the University of Oxford (Merton College), and in the processes against him is always styled "a layman and learned." He came from Birtsmorton Court, in Worcestershire, as shown in that very interesting book *Malvern Chase*, by the Rev. W. S. Symonds, and was personally well known to the Bishop of Hereford and the Canons of the Cathedral. He probably became acquainted with Swynderby at Oxford, and he was certainly very intimate

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with him before he joined him in Herefordshire. Walter Brut's zeal against the Pope is said to have been aroused chiefly by the impudent pardons and indulgencies of Pope Urban VI., granted to Henry Spencer, Bishop of Normond, to fight against the rival Pope Clement VII. He fully adopted the views of the Wycliffites, attached himself to Swynderby, and was so indignant at his condemnation, that he did not hesitate to express his opinion about it with the utmost freedom in the city of Hereford to the Canons themselves. This course soon drew forth an attack upon himself.

Two instruments were drawn up against Walter Brut, and carried to the Bishop at Whitborn, by Master Walter Pride, the Penitentiary of the Cathedral Church of Hereford. The first instrument stated that "at supper time on Oct. 15, "1391, in the dwelling house of the worshipful man Master John Godemoston, "canon of the Cathedral Church of Hereford, in the presence of Master Walter "Ramesbury, precentor; Roger Hoare, canon; Walter Walle, chaplain (being a "vicar of the choral), and certain other witnesses of credit, and in presence "of me, Richard le Whylare, clerk of Worcester, being a public notary by "the authority apostolic," Walter Brut "stiffly maintained" that Swynderby's condemnation was "naughty, wicked, perverse, and unjust;" that his conclusions were "true and catholic," and furthermore, "that the Pope was the very anti-Christ."—(Reg. Trefnant.)

The second instrument stated that Walter Brut, on Jan. 19, 1391-2, "person-"ally appeared before the Lord Bishop at Whitborn, and in his presence, and in "the presence of Master Reginald of Wolston, canon of Hereford: Master Philip "Dilesk, parson of Llannwryn (Montgomeryshire); Thomas Guldeffeld, parson of "English Bykenore; John Cressit, parson of Whitborn; and Thomas Walle-"wayne, household servant; especially called and desired as witnesses; and in "the presence of me Benedict Come, a public notary of the division of St. Asaph; "he did maintain that Christians were not bound to pay tithes, nor might law-"fully swear by the Creator, nor the Creature; and that Swynderby's conclusions "were just; and that he did eat, drink, and communicate with Swynderby, the "Bishop's sentence against him notwithstanding."—(Reg. Trefnant.)

Walter Brut was served with a series of seven charges against him, which are given at length in the Register, he was summoned to appear before the Bishop and answer them. Mr. Brut "partly appearing" says the account in the Register, "by his own self before us sitting in our judgment seat, and partly by his wit-"nesses specially appointed for that purpose," presented his answers to the articles and conclusions drawn up against him, "on divers scrolls of paper" written with his own proper hand, "in the form of 'two suppositions.'" This failed to satisfy the Bishop, who pronounced "his writing too short and obscure, and beg-"ged him to write more plainly and more at large." Whereupon Master Walter Brut, nothing loth, draws up a "declaration" covering a dozen skins with small writings, and which may be said to consist of a general argument drawn from Scripture against the Pope and the Romish Church.

The Bishop of Hereford then appointed Friday, Oct. 3, 1393, for the said Walter Brut to appear before him, sitting in commission in the Cathedral Church

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of Hereford, at six o'clock, or thereabouts, having for his assistants in the same place divers Prelates and Abbots, and twenty Bachelors of Divinity (whereof twelve were Monks and two Doctors of the Law), accompanied with many other Prelates and worshipful men, and wise graduates in sundry faculties.

The following is the list of the commission as given in the Episcopal Register :—

Masters in Theology.—John Green, Prior from Worcester; John Newton, Chancellor of the University of Cambridge; Everard, a Monk, Prior of the Monastery of St. Peter, at Gloucester; William Trewllys, treasurer of the Church of Exeter; Thomas Crawly, warden of New College, Oxford; William Colvyll, late Chancellor of Cambridge; John Myddleton, Canon of Hereford; Nicholas, Hereford; John Taclo, rector of Westbury; Brother John Bromson, Prior of the preaching Friars, Hereford; Brother John Ude, warden of the Friars Minor, Hereford; Brother Walter Warde, of the Order of Minors, Worcester; Brothers John Lendon, of the Order of Minors of the Convent; Brother Robert Mayal, Order of Minors; J. Dudley, Monk of Worcester.

Doctors of Latin.—Master Ludovic Aber, treasurer of the Church of St. Davids; Master Adam Uske.

Bachelors in Theology.—Brother Walter Chadesley, of the Order of St. Augustine; Brother Philip Gaudin, of the Order of Preachers; Master ——, from Cambridge.

Masters of Arts and Bachelors of Theology.—Master Walter Ramesbury, Precentor of the Church of Hereford; Master John Malune.

The discussion and arguments contiuned, "For all that day and two days following" (that is to say Friday, Saturday, and Sunday, October 3rd, 4th, and 5th)—and so cleverly and well did Master Brut hold his own in this trying ordeal, that from his declarations and writings "The Monks did gather and draw out "certain articles to the number of thirty-seven," which were taken to the University of Cambridge "To be confuted by those two learned men Master Colvyll and "Master Newton, who sat upon the commission; and they did both labour in the "matter to the utmost of their cunning." These articles are copied in the register, and were afterwards marked, all of them, as "heresy," or "error."

"Y Walter Brut, submitte me principaly to the evangely of Jhu Criste, and "to the determinacion of holy chyrche, and to ye general consayles of holy "chyrche, and to ye sentence and determinacion of ye four doctors on holy wryt; "that ys, Austin, Ambrose, Gerom, and G.G. (Gregory). And y Meklyilie sub- "mitte me to your correction as a soject ougte to ye byshop."

He read out this scroll "With a loud intelligible voice at the cross in the "churchyard, on Monday, that is to say, the sixth of the said month of October, "in the presence of the Bishop and his assistants, as also other barons, knights, "and noblemen, and clergy, and also a great multitude of people;" and immediately afterwards a certain Thomas Cranby, Master of Divinity, a member of the commission, made a sermon with the people, taking the second chapter of Romans for his subject: "Be not overwise in your own conceits," &c. (Reg. Trefnant.)

The following curious contemporary notice of Walter Brut occurs in the

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"Vision of Piers Ploughman:"—

> Behold upon Walter Brut
> Whom bisiliche thei pursurden,
> For he said him the sothe (p. 489).

Two very curious anonymous letters appear in the Hereford Episcopal Register, which show great candour and liberality on the part of the Notary; one purports to be from "a Lollard," and the other from "Lucifer, Prince of Darkness, and the persecuting Prelates of the Popish clergy"—both are severely satirical on the Pope and the Romish Church. The real authors are unknown, but amongst others they have been attributed to Swynderby and Brut—a copy of the "Lucifer" letter exists at Paris, with the earlier date of 1385, but without any indication of its author. The Bishop of Hereford, though he thus condemned and excommunicated the Lollards in Deerfold felt himself powerless against them. In the wilds of the forest they were secure, set at naught his ordinances, and continued to teach and to preach with impunity. He therefore appealed to the Archbishop of Canterbury, to the king, and to the Pope himself. The king forthwith issued a commission against the Lollards in general, and in particular against "a certain fellow named William Swynderby, pretending himself to be a chaplain, "and one Stephen Bell, a learned man, who though condemned and excommuni-"cated by the Bishop of Hereford, have conveyed themselves by and by into the "borders of Wales, with such as even their factors and accomplices, keeping them-"selves close," &c., &c., ordering the aforesaid William and Stephen to be arrested and committed either "to our prison or to the prison of the same Bishop," and then "to keep them safe," &c., &c., dated from Westminster, March 9th, 1392-3, and signed "Farrington," (Reg. Trefnant, trans.), and the king sends a second letter, dated September 22nd, 1393, against "Walter Brut, and other "such children of iniquity; ordering them to be arrested, imprisoned and punished."

Two years later the Bishop of Hereford appeals to Pope Boniface XIX. for assistance, and receives from him a Bull, enclosing a copy of one he had sent to King Richard against the Lollards, with a scolding to the Bishop himself for not having written more strongly to the king about them—copies appear in the Episcopal Register, and they show that the Pope spared no energy in language to put an end to the schism.

Nothing further appears in the register with reference either to Swynderby, Walter Brut, Stephen Bell, or the others. Swynderby is known to have escaped harmless during the reign of Richard II. Fox thinks he was one of the earliest martyrs, and that he was burnt in Smithfield in 1401 in the presence of a great multitude of people; others think that "he in prison died;" or others again "that he went abroad." This last solution seems the most probable, for he was far too well known and sought after to be burnt or imprisoned as it were anonymously; and the great foresight and caution which stand so prominently forward in the study of his character, create the belief that he would not fail to find some means of escaping from his enemies.

The extreme seclusion of the Forest of Deerfold certainly afforded a safe

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refuge to Swynderby and his companions. That they remained there for a considerable time is beyond question; and though we know Lord Cobham was captured in Powys lands, there is no record of anyone being seized and sent to the stake from the wild woods of Deerfold.

The mention of a chapel or chantry in the Ecclesiastical Registry at Hereford, as existing both in Deerfold and at Newton, previous to the arrival of Lollards, led to strict enquiries being made about them. At Newton there is a field called "Chapel Meadow," and in this field the foundations of some small building are still to be traced. At Deerfold, the name of "Chapel Farm" on the ordnance map directed inquiries to be made there, with the interesting results which have already been pointed out to you this morning on the spot.

The farm-house itself, on close examination, proved to be an old oak building of a very interesting character. It was constructed by a framework of solid oak resting on a stone plinth and filled in with stone walling—though now divided into several rooms. It was built as one large room, or hall, 44 ft. 9 in. long, by 18 ft. 9 in. wide. It stands due east and west, and at the centre of the east end there is a break in the plinth 6 ft. 3 in. wide, where a communion table might have stood; and it is remarkable that the only piece of furniture in the house belonging to the landlord exactly corresponds with old communion tables. It was made to stand against the wall, with turned front legs and a loose top. The solid oak posts, sills, and quarterings, are moulded in front, and cut to carry the roof trusses, and between the roof trusses were carved braces, with cusps, and terminal leaves, forming a handsome and regular pattern throughout its whole length. Outside to the south of the building is an orchard containing two large yew trees some centuries old, which is called, by tradition, the burial ground. The Woolhope Club is greatly indebted to one of our members, Mr. Thos. Blashill, of London, the eminent architect, for the interest he took in carefully examining the building and giving its minute description, with the careful drawings and plans, which appears in the volume of Transactions of the Club for 1869. Mr. Blashill came to the conclusion, from its structure, that the building was the hall or principal part of a 14th century house, and for the good reasons which will be found in the report referred to. To this it must, however, be rejoined that there is not the least trace of any other portion of building, which must have existed, and must also have been considerable in a house where the hall only was so large in size; not to mention the improbability of such a house having been built in a wild forest of this character.

There are a few ornamental floor-tiles remaining, of a similar character to those at Wigmore Abbey and other places of this district and period; and on examining the stones forming the plinth, some two or three seemed to be worked stones, and one had a splay cut on it, as if it might have been used in some former building.

There was no real evidence, therefore, afforded by examination, as to whether the Chapel Farm-house occupies the site of the ancient chantry. Five years afterwards, the portion of the plinth at the north-west corner, where these worked stones had been observed, was taken down in the repair of the building, when

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several of these stones were found to be carved, and in one large stone a simple Gothic window, in excellent proportions, had been cut. The stone with the window cut through it, was laid on its side, and so, too, were all the other carved stones, which must evidently have been done for the purpose of concealment. These worked stones, and this small window, belonged, doubtless, to the original chantry, and, had more of the plinth been taken down, further evidence of the same nature would probably have been found.

Taking all circumstances into consideration, therefore, the conclusion seems inevitable that the "Chapel Farm" was the original Chapel built by the Lollards; that it occupies the site of the ancient chantry of which the materials were used in its construction; and that it was purposely built to resemble a hall of the period, in order to conceal the purpose for which it was used, and thus, too, the worked stones of the original chantry were intentionally concealed in its supporting plinth.

In the Harlerian M.S. of the date 1655, is mentioned—"The chapel of Deer-"vold, a privileged place, now in the possession of one Richards, mentioned in "Fox's Martyrology as a place frequented by Lollards, and so Derevold Forest." (6726).

Gough's *Camden*, after speaking of Wigmore Castle, and also a forest called Deerfold, corruptly Darval, adds: "In the village of Darval, are ruins of a chapel "which some called Lollards' Chapel, because they were wont to meet at this "vill." (p. 79.)

If the "Chapel Farm" is not the site of the ancient "chantry" and the "chapel of the Lollards," you will seek in vain for any other site in the Forest of Deerfold, where they could have been placed.

THE ASARABACCA.

(Asarum Europæum.)

THIS plant belongs to the natural order of *Aristolochiæ*. It is an introduced plant, but has long since been naturalised in some five or six localities in the north of England, and in one in Scotland.

In the Forest of Deerfold, it has taken possession of a hedge-bank, amongst the roots of thorns and brambles, and grows with great luxuriance for some forty yards. The locality is on the slope of the hill, on the western side, at no great distance from the ruins of the Priory of Lymebrook, and was very probably introduced there by the charity of some energetic sister who knew its value as a medicinal plant, and used it in her ministrations among the sick poor of the neighbourhood.

The *Asarabacca* is a plant possessing considerable medical properties. It is a powerful irritant, and was used, like ipecacuanha, as an emetic, or purgative, but its action is very much more uncertain, and occasionally very violent. In the 14th and 15th centuries it was held in high repute. At this time the absurd belief in the doctrine of "signatures" prevailed; that is, the belief that all natural productions indicated, by some external sign, the diseases in which they were efficacious. The two leaves of the *Asarabacca*, as you see, bear a rude resemblance to the human ear, and thus it was especially used in all diseases of the ear. In the

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same way the yellow-juiced Celandine *(Chelidonium major)* was thought especially useful in jaundice; the knotted figwort *(Scrofularia nodosa)* for scrofulous swellings; the mottled-leaved lungwort *(Pulmonaria officinalis)* for diseases of the lung; the scarlet poppy *(Papaver rubrum)* for fevers and erysipelas; and so on. It remained in the British Pharmacopeia up to the commencement of the present century, where, in the shape of a powder with marjoram and lavender, it formed the active ingredient of a snuff that was used as a powerful derivative for various affections of the ears, the eyes, and the head.

The medical virtues of *Asarabacca* have been known from remote antiquity. It is the "*adagor*" of Dioscorides and other ancient authorities. Its generic name being derived from the Greek negative, "a," and "sairo" "orno," to adorn; "because," says Pliny, "it was never admitted into the ancient coronal wreaths." Its well-known power leads to the suspicion that in the very few localities in which it grows in Great Britain, it has been introduced for medicinal use. It is a very rare British plant, and, so far as is known, this Deerfold Forest locality is the only one in which it grows wild in this part of England.

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Woolhope Naturalists' Field Club.

JULY 12TH, 1881.

RHAYADER AND CWM ELAN.

"Clos'd is the pink-eyed Pimpernel,
'Twill surely rain. I see with sorrow
Our jaunt must be put off to-morrow."

AT one meeting during the year, ladies are specially invited to aid the scientific proceedings of the Woolhope Club. This year a very attractive programme was issued by the committee to visit the beautiful scenery of the river Elan, near Rhayader, on Tuesday, the 12th, and the acceptances were very numerous. The weather is always an element of uncertainty, and most people awoke to discover a cloudy sky and a pouring rain. Botanists never neglect the "shepherd's weather glass," which grows too much unobserved in every garden, and those who did so on the present occasion were rejoiced to find that the pretty pink blossoms of the Pimpernel *(Anagallis arvensis)* were widely open, and so they said "the rain will lay the dust for us, cool the temperature, and clear the air." The Pimpernel was right, for the weather cleared up by nine o'clock, and the day turned out beautifully fine.

The carriages reserved at the Barton Station were soon filled, additional members and visitors joined *en route*, and on the platform of the Three Cocks Junction, the scientific phalanx was a hundred strong, save only one. The river Llynfi from Llangorse Lake runs close by the station, and under the pleasant shade of the oak trees on its banks, sundry papers were to be read, but there were a hedge, and a ditch, and a five-barred wire fence to be surmounted. These serious obstacles were somehow or other got over—what won't the enthusiasm of science accomplish!—and the President read to a large group assembled around him, a paper on "Some of the Rare Pond-weeds of Herefordshire," and exhibited many carefully-prepared specimens of the family of *Potamogeton* to illustrate it. When the President had finished, and his efforts had been duly acknowledged, a carefully prepared and interesting paper, entitled "Book Notes about Rhayader," was read by Mr. J. E. Norris. The President gave the thanks of the Club to Mr. Norris, and called upon Mr. Alfred Purchas, to read his account of "The Little Green Moth—Tortrix viridana," which has been so destructive to the foliage of the oak tree during the present spring. The little moths were exhibited, and their life-history very interestingly given.

By this time it was necessary to regain the platform for the 11.15 train, and proceed up the Valley of the Wye, by the Aberedw Rocks and Builth to Llechryd Junction, and on, thence, by special train, to Rhayader, which destination was reached about half-past twelve.

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The station at Rhayader was a sight to see. The approaches were crowded with vehicles of all descriptions, and the inhabitants of all ages occupied the embankments and "every vantage ground" to receive the visitors in silent homage. The visit of the Woolhope Club seemed an event of extraordinary interest. Rhayader had been suddenly called upon to find carriage conveyance for a hundred and two devotees of science, and it required all the obliging energy displayed by Mr. J. Powell Williams, of the Lion Hotel, to be equal to the occasion. The selection of traps and horses offered to the visitors was very varied, but a ready and cheerful good nature prevailed everywhere, and all went well. "What a nice young horse this is," said one of the drivers, "you would not think he had only been in harness three or four times; yes, indeed; and he can go like the wind if he likes, but he is young and must be taken gently." And so well and carefully was he handled—with a touch delicate as a woman's—that the rather startling nature of the information was quite balanced by the pleasure of seeing it done. The Cymri were ever noted for skilful dealings with cattle, and that no accident happened throughout the day happily tended to show that they have not lost "their cunning" in this respect.

The Vale of the Elan is widely celebrated for its great beauty. It is the gem of South Wales, and never could its scenery have looked more beautiful than it did on this lovely day of sunshine and cloud. As the broad valley grows narrower in the tortuous channel the river has cut for itself through the hills, the view recalled to the visitors Scotch or Swiss scenes of singular beauty, for the hills rise to a considerable height and give now a warm glow of heather, and again a bold escarpment of precipitous rocks. The immediate banks of the river are well wooded, and it was marvellous to see how the trees seem to grow from the very rocks themselves. Oak trees of some three or four feet in circumference stood on masses of crumbling shaly stone, as if they neither had nor required further soil to grow in. The poet Bowles has given a long and charming description of the scenery, from which we take this passage :—

"Now wind we up the glen, and hear below
The dashing torrent in deep woods concealed;
And now again, while flashing on the view
O'er the huge craggy fragments—
But loftier scenes invite us; pass the hill
And through the woody hanging, at whose feet
The tinkling Elan winds, pursue the way."

But even he does not do justice to his theme. The river itself which he so lightly touches—"the tinkling Elan"—forms perhaps the greatest charm of all. In the soft and pleasing aspect it presented on this occasion, when its waters rushed hurriedly along, around, and through, the huge boulders which are everywhere scattered thickly along its course, it was most attractive; but in its sterner mood the Elan is a torrent of wonderful power, and only last winter washed away every bridge that vainly tried to stem its fury. Bright as the weather was, several fishermen were exercising their art, for the water carried a stain from its mountain sources; and who would not be a fisherman to visit such scenes? The beauty of the scenery, however, must not be longer dwelt upon, for the Woolhope Club has ever a scientific object in view, and the botanists were at work in collecting and cataloguing the Radnorshire plants at this time in flower.

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The mansion of Cwm Elan, and its grounds, a highly cultivated oasis in the wild scenery, formed the centre of re-union, and here, under the pleasant shade of the trees, Dr. R. Richardson, F.G.S., of Rhayader, read the following address:—

THE GEOLOGY AND PHYSICAL ASPECTS OF CWM ELAN.

Mr. President, Ladies and Gentlemen,—Allow me first of all to greet you with a cordial welcome to this beautiful scenery of Cwm Elan. I have also to thank the Central Committee of the Woolhope Club for the distinguished position I occupy here to-day. The subject upon which I have to address you is rather a dry one, especially as regards the ladies, and I must ask your indulgence for any shortcomings. The science of geology is somewhat more difficult to treat in a popular style than any other, on accouut of the number of scientific terms used which may confuse the understanding of the uninitiated.

Cwm Elan stands 800 feet above sea-level, and its history is as follows:—The first owner of whom I have any account, was that eminent scholar, Mr. Johns, of Hafod, Cardiganshire. He had the best library in Wales, and he also had a private printing-press; but, unfortunately, a fire broke out, and the valuable collection of books was totally destroyed, which was an irreparable loss to the literature of Wales. Since then the estate has passed through many hands—Mr. Grove, the Duke of Newcastle, Messrs. Peel, Otway, Green-Price, until it reached the present owner, Mr. Lewis Lloyd, of Nantgwillt, through whose courtesy and kindness we are now assembled. It is a general belief in this country that the poet Shelley lived here, but Mr. Lewis Lloyd tells me that it was at Nantgwillt he lived, as there was a pane in a window there upon which Shelley's name was written. Cwm Elan has always been a place well worth visiting, and Professor Ramsay, a high authority on scenery, said to a friend of mine, Mr. Powell, of Glaslyn, that Cwm Elan furnished the finest scenery to be met with in Wales, owing to the beautiful colour, and harmony of the rocks, trees, and water, a combination seldom found in nature. Bowles in his poem on Cwm Elan (or Coombe Ellen, as he calls it), in a strain of ecstacy describes the beauties of this romantic spot, and I should recommend you to read that poem for yourselves.

After these few introductory remarks, I shall now enter on the subject of the day—the Geology of Cwm Elan. Little has yet been done by geologists in this district; Professor Keeping has explored some portions of it with his geological hammer. The rocks from Rhayader to Cwm Elan are composed of pale slate, grit, and conglomerates, and the metalliferous slate. All of these belong to the Plinlimmon group of Sedgwick and Keeping, and the lower Silurian of Murchison. You may see the three formations in that gorge called Cabancoch, through which you passed on your way up where the rocks were so precipitous. The Rhayader pale slate corresponds with the Taranon shale of North Wales, and the grits and conglomerates are the same as those of Plinlimmon and Gwastedyn, to the east of Rhayader. The metalliferous slate corresponds with the slate rock quarries of Corris, and the slate quarries near Machynlleth.

Some years ago, the pale slate near the surface of the hill opposite, was used for roofing, but was found to be rather too thick and heavy, and it soon had to

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give place to a blue vein discovered in the metalliferous slate at Dolmynach and Cwmparadwys. This slate is of excellent quality and durability, in every way equal to that from North Wales. This stratum also abounds in lead and copper ore, which is one of the characteristics of this formation. Cwm Elan and Nantycar Lead Mines are in this neighbourhood, as is also the Dalrhiw Copper Mine which has been lately discovered.

There is a paucity of fossils here. There are, however, a few Graptolites, which belong to one of the lowest orders of organization—the Palæozoic. We find in geology that the fauna ascend in the scale of organization as the geological formations ascend in the order of time by gradual development, until we reach the alluvial deposits, which contain the skeletons of fauna resembling those of the present time. The hills here were formed by an upheaval long before there was dry land, which, no doubt, was caused by the expansion of subterranean heat and gases. All stratified rocks were formed by an aqueous deposit, the deposit of mud in shallow or calm seas, and by pressure these slaty strata were formed. No doubt the layers were formed horizontally; since then, from internal disturbance, they were raised and contorted, producing the anticlinal and synclinal of the Plinlimmon group. The synclinal extends as far as Rhayader from the hill; the dip of these beds is inclined to the east. The valleys were produced by denudation from the action of ice, frost, rain, and the river. There is every evidence that ice had a great deal to do in scooping out these valleys. Professor Ramsay thinks that the lakes on the hills were formed from the same cause, such as the Cerrigllwydon Pools, Gwengy Pool, and the Teifi Pools in this locality, and all other lakes or pools in a similar way. We have evidence of large boulders in great thickness through the valley of Cwm-ar-lechwedd down to Llanwrthwl. Most of us have observed the deep channels cut in brooks and rivers after each heavy flood; what would be the effect of this in thousands or millions of years? You have only to observe how the Elan has worn down the rock into deep pot-holes, and that very deep channel at Pontyrhyllfan (the bridge of the awful place). I cannot do better than here quote a few of the descriptive lines of Bowles on this place:—

> And now a little onward, where the way
> Ascends above the oaks that far below
> Shade the rude steep, let Contemplation lead
> Our footsteps—from this shady eminence.
> 'Tis pleasant and yet fearful to look down
> Upon the river roaring, and far off
> To see it stretch in peace, and mark the rocks,
> One after one, in solemn majesty
> Unfolding their wild reaches, here with woods
> Mantled, beyond abrupt and bare, and each
> As if it strove, with emulous disdain,
> To tower in ruder, darker amplitude.
> Pause, ere we enter the long craggy vale:
> It seems the abode of Solitude. So high
> The Rock's bleak summit frowns above our head,
> Looking immediate down, we almost fear
> Lest some enormous fragment should descend
> With hideous sweep into the vale, and crash
> The intruding visitant. No sound is here,
> Save of the stream that shrills, and now and then
> A cry as of faint wailing, when the kite
> Comes sailing o'er the crags, or straggling lamb
> Bleats for its mother.

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The river Elan rises on Ty-newydd hill in Cardiganshire, and within about a mile and a half of its source it sinks under some black turbary ground for about fifty yards, and where it appears again is called Byrlyman Elan (Elan Bubbles). It runs in a course of twelve miles before it joins the river Claerwen at Nantgwillt.

Throughout this district there is much sameness in the geological formation, the only thing attracting the attention of visitors being the scenery, which is considered by many to be that of a minature Switzerland.

This will be recorded as a red letter day in the history of Cwm Elan, as I do not think that it has ever before been visited by such a numerous gathering of scientific explorers. A good deal might be said on the botany of the district, and I hope that the attractions of the neighbourhood are such that the Woolhope Club may again be induced to visit us, when one of your members might read a botanical paper.

A map of the geological section of the district was shown to illustrate the different strata, and Dr. Richardson afterwards exhibited several objects of interest in bronze and stone found in the neighbourhood.

In the absence of the President, still away busily cataloguing the wild plants of the district, Dr. BULL, amidst warm applause, gave the thanks of the members of the Club, and of all the ladies and gentlemen present, to Dr. Richardson, not only for the interesting address he had just given them, but also for all the trouble he had so kindly taken to render their visit so pleasant and agreeable.

The members now adjourned for the excellent cold collation, which had been so well provided for them at Cwm Elan, by Mr. and Mrs. Williams, of the Lion, and they afterwards separated to follow the bent of their several inclinations. Some seated themselves on the rocks in the bed of the river, to enjoy in silence the rushing torrent, Mrs. R. Lewis Lloyd very kindly came herself to the meeting, and carried off some of the members to see the beautiful grounds of Nantgwillt, situated at the junction of the river Claerwen with the Elan. The President and a few other enthusiastic botanists set off up the valley and over the hills, cataloguing still the Radnorshire plants, and they only appeared again at Rhayader station just in time to catch the return train. Others followed the guidance of Dr. Richardson across the slender bridge and up the opposite hill, and were rewarded by a lovely and extensive view of the windings of the valley, with the bold and rocky mountains surrounding it, whose steep gradients and rocky precipices might well be found, as they were, quite impracticable by the few who attempted in vain to scale them. Botany was the order of the day with most of the ladies present, and it must suffice now to allude briefly to a few of the more interesting plants which were found. Ferns were very abundant. Every rill that rushed down to join the Elan had all its nooks and corners crowded with their beautiful fronds. The oak and beach ferns, *Polypodium dryopteris* and *P. phegopteris*, were found plentifully; the elegant little fern, *Cystopteris fragilis*, hung here and there very gracefully; there were splendid specimens of Withering's fern, *Lastrea spinosa;* and of Roth's fern, *Lastrea dilatata*, and many of the more ordinary ferns. Most abundant and beautiful, as it ever is, was the Lady

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fern, *Athyrium filix-fœmina*. As Calder Campbell says :

But not by burn, or wood, or dale,
Grows anything so fair
As the plumy crest of the emerald pale,
That waves in the wood, or soughs in the gale,
Of the Lady fern, when the sunbeams turn
To gold her delicate hair.

Fern collecting scarcely formed any part of the day's proceedings, however, though, the suggestion was kindly given to the visitors by an amusing notice requesting them "not to carry off *all* the ferns."

Many of the bog plants found were very interesting. The Sun-dew, *Drosera rotundifolia*, was plentifully seen. It derives its name from the fact that its small, round, green leaves are fringed with long red hairs, supporting at their ends small drops of a pellucid liquor, like dew. These drops continue in the hottest weather under full exposure to the sun, and in reality are the means by which the plant catches the small flies it feeds upon, for it is an insect eating plant, and on every leaf could be seen the vanishing remains of small flies. The poet who wrote the following lines could scarcely be aware of this fact :

By the lone fountain's secret bed,
Where human footsteps rarely tread,
'Mid the wild moor or silent glen,
The Sun-dew blooms, unseen by men :
Spreads there her leaf of rosy hue,
A chalice for the morning dew ;
And ere the summer's sun can rise,
Drinks the pure water from the skies.

The Butterwort, *Pinguicula vulgaris;* the Marsh Violet, *Viola palustris;* the Marsh Cinquefoil, *Comarum palustre;* and that most delicate and pretty of all bog plants, the Bog Pimpernel, *Anagallis tenella*, which always cheers the heart of a botanist to find.

Of fairer form and brighter hue
Than many a flower that drinks the dew
Amid the garden's brilliant show.

Amongst the more rare plants found, the rarest perhaps, of the day, was the Wood-bitter Vetch, *Vicia orobus*, the wood vetch, *Vicia sylvatica*, was brought to the meeting, though it was not observed at Cwm Elan. It is this elegant vetch which climbs so well, with its pale flowers beautifully veined and streaked with blue, which Scott describes :—

And where profuse the *wood vetch* clings
Round ash and elm in verdant rings,
Its pale and azure-pencilled flower
Should canopy Titania's bower.

The bell flowers, *Campanula latifolia*, and *C. rotundifolia*, were plentiful. *Linaria minor*, *Jasione montana*, and others too numerous to mention were also found. One more only can now be named, and that is the *Viola lutea*, the yellow mountain pansy, that was so prettily scattered amidst the short grass of the mountain sides.

The time of the visitors was only too short to enjoy this lovely valley, and before half the explorations were over the whistle sounded, and carriages had to be regained as quickly as might be for the return train.

The following gentlemen and ladies took part in the day's proceedings :—The Rev. Augustin Ley, M.A. (president), Mr. J. Griffith Morris (vice-president),

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Mr. W. Armitage, Rev. Joseph Barker, Rev. Canon Bevan, Mr. Edward Bevan, Dr. Bull, Mr. H. P. Bull, Dr. Chapman, Mr. P. C. Cleasby, Mr. Colborne, Mr. T. C. Curley, Mr. James Davies, Mr. A. C. de Boinville, Major Doughty, Mr. Edward du Buisson, Rev. W. D. V. Duncombe, Mr. Charles Fortey, Mr. J. T. O. Fowler, Rev. J. E. Grasett, Mr. Hargreaves Heap, Dr. Hincks, Rev. E. J. Holloway, Mr. A. Levason, Mr. Peyton Levason, Mr. Gilbert Mason, Rev. G. M. Metcalfe, Mr. H. C. Moore, Mr. J. E. Norris, Rev. H. W. Phillott, Mr. G. H. Phillott, Mr. Poynder, Rev. Edward Price, Mr. Alfred Purchas, Mr. Alfred Shaw, Rev. W. R. Shepherd, Major McGregor, Mr. Henry Southall, Rev. Berkeley L. S. Stanhope, Rev. Stephen Thackwell, Rev. Wm. Thomas, Rev. F. S. Stooke-Vaughan, Rev. H. E. Victor, Rev. R. H. Williams, Dr. Wilson, Mr. H. H. Wood.

LADIES.—Mrs. Armitage, Mrs. Barton, Miss Kate Beddoe, Miss Bevan, Miss Blinkhorn, Miss Bull, Miss Evelyn Bull, Miss Maude Bull, Miss Annie Cartwright, Miss Chapman, Miss Laura Chapman, Mrs. James Davies, Miss Du Buisson, Miss Duncombe, Miss Edwards, Miss Fairchild, Mrs. J. T. Owen Fowler, Mrs. G. B. Hanbury, Mrs. Havergal, Miss Havergal, Mrs. Hargreaves Heap, Mrs. Hincks, Mrs. Holden, Mrs. A. G. Jones, Miss Lambe (Dilwyn), Mrs. Levason, Mrs. Frank Lowe, Miss Geordie Lucas, Mrs. G. M. Metcalfe, Mrs. J. G. Morris, Miss Harriet Morris, Miss Caroline Morris, Mrs. F. Poynder, Miss Edith Price, Mrs. A. Purchas, Mrs. Radley, Miss Reynolds, Mrs. W. R. Shepherd, Mrs. McGregor, Miss Stallard, Miss Spofford, Mrs. Tatham, Miss R. Tatham, Mrs. Stooke-Vaughan, Miss Stooke-Vaughan, Mrs. Webb, Miss Weyman, Miss Wilding, Mrs. A. G. Williams, Miss Wood, Mrs. J. E. Woodhouse, Miss Woodhouse,—Theophilus Lane, Secretary.

At Rhayader station the visitors were met by Dr. Richardson, who kindly acted as guide for the day. The Club was also favoured with the attendance of Mrs. R. Lewis Lloyd and family, of Nantgwillt; General Sladen, Mrs. Sladen and family, from Rhydoldog; Dr. F. L. Richardson, of Rhayader; Mr. H. Vaughan-Thomas; Captain S. W. Williams; Mrs. Clement Jones, Dolgarddow; Mr. J. Price and Miss Price, Rhayader House; Mr. Edwards, Glanserth, Rhayader; Mrs. Evans and Mr. Evans, Alma House; Mr. Richard Laugharne, the Vicarage; Mr. G. M. Jarman, Rhayader; and Messrs. T. Price, H. H. Price, and Miss F M. Price, from Manchester.

The day's excursion proved most enjoyable. The weather was all that could be wished, and the members of the Woolhope Club and their friends returned well pleased with their visit to Cwm Elan, and very grateful for all the attention and kindness that had been shown to them throughout the day.

The following papers, in addition to the learned discourse of Dr. Richardson on the geology of Cwm Elan, were read in the course of the excursion.

Mr. J. E. NORRIS read a paper entitled

BOOK NOTES ABOUT RHAYADER.

The town of Rhayader, as will be seen when we arrive there, is a very small

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place, containing only some 750 inhabitants. It consists of four streets intersecting each other at right angles, nearly N., S., E., and West. In the centre is a Town Hall, built in 1762, the principal rooms of which are upstairs, and are supported upon massive oak pillars. There are two stone arches, one at the east and the other at the west end. Upon one of these is a sun-dial, and it may possibly interest some to know that it was made by a local celebrity and learned arithmetician, the Rev. Llewellyn Davies, of St. Harmon, a town near Rhayader.

The bridge over the Wye (which is now under repair) was built in 1780, and is the uppermost stone bridge standing over the Wye, as all the others above it were washed down during the floods of last winter.

Tradition says Rhayader was of far greater magnitude, and that it extended from Cefn Ceidio on the east, to Felindrê on the south, and that the avenues were once inhabited streets. At all events, it was once considered a very important place by the Rhyses and the Gwynedds, Princes of South and North Wales, being the scene of frequent contest and of many bloody sieges. It was in the church of Rhayader, in the presence of the chieftains, that Rhys of Gwynedd, the Prince of North Wales, confirmed the grant with which he had endowed the then newly-founded Abbey of Strata Florida (1164), now a beautiful ruin in Cardiganshire, between Tregaron and the Devil's Bridge. In 1340, in the reign of Edward III., Rhayader was the property of Roger Mortimer, Earl of Wigmore and Marche (of whom you heard mention at our last meeting at Wigmore Castle), and it remained in that family until Edward IV., Duke of York, ascended the throne, when it became part of the Crown property (1461).

The town suffered severely during the disturbed times of Owen Glyndwrdwy, as well as under the oppressive edicts of Henry IV. consequent upon such disturbances. These harsh measures existed until the accession of the English Tudors, when they ceased (1485).

There were held at Rhayader a County Court and a Court of Session. The hall or court was situate at Pen-y-Porth, on the bank overlooking the Wye, just above the bridge, and the present Presbyterian Meeting House was the gaol or prison. The iron rings and chains to which prisoners were bound, and the bars of the windows are shown to this day. Executions took place on the north end of the town, near a house known by the name of Pen-y-Maes.

At last Rhayader was deprived of these Courts, and it arose in this way. A band of ruffians who called themselves Lant Mat, or the children of Mat, composed of disbanded soldiers and others, living in the caves about the Devil's Bridge, waged war and exacted black mail over the surrounding districts. They arrived one night on the right bank of the Wye and concealed themselves in the thick grove of oaks at a place called Dderw, where, being informed by their spy that the judge would repair at a certain hour on the ensuing morning to the Church at Rhayader, before commencing his duties at Sessions, they sallied forth, crossed the river at Waun-y-Capel, met him at Maesbach, fired, and shot the venerable man through the heart. During the amazement of those who attended, the assassins effected their escape, and returned over the hills to the mountain fastness. The country soon rose up against them—the murderers were besieged in

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their rocky den, taken and executed. After this it was ordered by Parliament that the Sessions should be removed to Presteign, where the County Court was henceforth to be held, alternately with New Radnor. The men of Rhayader were among the royal supporters of Charles I., and were denounced by the Parliamentarians as "malignant." A court of inquisition was held here by commission for investigating and confiscating the royal inheritance of Charles Stuart.

We will now shortly glance at what betokens the site of the ancient Castle of Rhayader. The position was one of great importance. The original foundation of the castle still may be traced.

The only entrance at present which preserves a communication with it is a narrow space on the north-east, between two deep trenches cut out of an exceedingly solid Schistose rock; the one trench leads to the river towards the north, the other is more inclined to the east. I believe we shall have a guide at Rhayader, and therefore I merely draw your attention to these features to aid your research. There were several tumuli around Rhayader, one of which stands at the brow of the hill to the west, which overlooks the town. It served as a vigilatory post to communicate to the garrison intelligence of the approach of an enemy. The particular situation of this outwork, and indeed of the fortifications of the town, which extended from the north bank of the Wye to its southern side (having the castle and other tumuli now destroyed in the centre of the line westward), and leaving its eastern side totally undefended, explains the reasons for this construction, and the description of the enemy against whom they had to guard.

The Normans and Flemings who had settled upon the sea coasts of Pembroke and Cardigan were depredators of the cruelest kind. These fellows murdered Eincon Clyd and Morgan at Meredudd, on the hills of Cwmdauddwr, as they were quietly returning from Aberteifi. Rhys, Prince of South Wales, accordingly coustructed this castle in repelling such sanguinary invasions. It was here he repulsed the attack of the sons of Conan (the illegitimate off-spring of Owen Gwynedd, Prince of North Wales), in 1178, who returned to their own country stung with disappointment. Some seven years after, Rhys, Prince of Wales, being imprisoned by his sons, burnt this castle to the ground. But the old man, the father, recovering his liberty, and knowing that this position of Rhayader commanded the pass from North to South Wales, re-built and re-garrisoned the castle in 1194. It was consigned to the keeping of Cadwaller ap Madoc, who manfully opposed the inroads of the house of Mortimer until 1230, when he died. The estate of Cadwaller passed to his children, and upon their becoming disunited, it fell into the hands of Roger Mortimer, Earl of Wigmore and Marche.

Shortly after this event, Llewellyn ap Jorwerth, Prince of North Wales, having defeated Hubert de Bourgh, the general of Henry IV., and compelled him to retire from Wales, destroyed most of the Norman castles constructed in the Marches, and, leading his victorious army into this district in 1410, laid siege to the castle of Rhayader, burnt it to the ground, and put the whole garrison to the sword. The site on which the castle stood merged to the Crown at the accession of Edward IV., and is now vested in the Earl of Oxford or those who claim under him.

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There is a beautiful supply of spring water into the town of Rhayader. It rises at the extremity of Maes-y-dref, and is conveyed by an artificial channel past the house-doors, in the same way as water is carried into the town of Honiton, in Devonshire. The stream is called Bwgey, and they say the reason the children of Rhayader are so beautiful is on account of their drinking of this water; a happy opportunity to the ladies present who may be desirous of renewing their beauty. There is a beautiful ruin—Cwmhir Abbey—founded in 1143 by Cadwaller ap Madoc, about six miles from Rhayader. It was partially destroyed in 1401, by Owen Glendwr, because of his enmity to the Mortimer family. At the time of the demolition of the monasteries in 1536, 27 Henry VIII., and when the estates passed to the Crown, there were only three monks living there. Full particulars of this abbey will be found in the fourth volume of Archæologia Cambrensis, page 233.

Here we have, some six miles away, near the Devil's Bridge, the beautiful ruins of the abbey of Strata Florida, or Streteflere, in Cardiganshire, where most of the Princes of South Wales are buried, beginning (in 1175) with Codell, son of Gruffud ap Rhys, and brother of Rhys ap Gruffyd, the founder of the abbey. This abbey was the Westminster Abbey of Wales. In the disastrous wars following the death of Llewellyn ap Jorwerth, which rivetted the English chain upon the Welsh people, Strata Florida Abbey was burnt down.

There is a glen not far from Rhayader, a small, dark, and lonely lake, called Llan-gwyn, or the lake of the croaking trout. The story goes that when Strata Florida was destroyed, a monk came to this lonely lake (as a help to the brethren on fast days) and prayed that every trout thenceforth caught in this lake should testify by its voice its abhorrence of the acts of the ruling powers on this earth. Well, be that as it may, the trout, when taken out of the water do croak, and the common people won't eat them. All I can say is, when we get to Rhayader, may we have some of these trout—that we may convince the good people of Rhayader that we have no fear in eating these enchanted fish—but, on the contrary, have to thank them for, by their abstinence, preserving the fish for our enjoyment.

I hope these few remarks and "book notes" will help you to trace out the ruins, or rather the foundations, of the old castle in the town of Rhayader gwy, which in Welsh means "the Cataract on the River."

THE TORTRIX VIRIDANA, OR GREEN OAK MOTH.

THE following paper was read by Mr. Alfred Purchas, of Ross:—

Ladies and Gentlemen,—I propose to detain you only a few moments with a short paper I have prepared. The subject is "*Tortrix Viridana*" (the little green oak moth). This pretty little pest of the oak tree is perhaps, like many other small moths, little known to the dwellers in towns, or even to many who pass their time in the country, but to the observant owner of an oak wood, it must be known as a most persistent enemy; often nearly stripping the oak of its first leaves, and causing them, after being green in the middle of May, to almost resume the brown appearance of winter by the middle of June. It is one of many ex-

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amples of a remarkably small animal doing an immense amount of damage. Like many other insects it is from some cause or other excessively abundant in particular seasons. This year it has been remarkably so, and, combined with the effects of late frosts, made the oaks, in many places, quite bare and brown. Whether there is any connection with the fact of the late hard winters having destroyed such large numbers of the small birds as to make them noticeably less abundant than usual, might be an interesting subject of inquiry. I have little doubt that this is one great reason.

The larva or caterpillar is hatched from eggs laid the previous season, early in May. As soon as the oak leaves unfold, it speedily commences to roll down the corner of a leaf to afford itself protection both from cold, and also from its natural enemies, the small birds, who are just at this season making enormous demands on the insect tribe to supply their nests of young. In ordinary seasons the oak furnishes them with abundance of food without the eaten leaves being missed, but, as I said before, when they are so excessively abundant as in the present season, they not only strip the oaks, but have to descend to the nut and other trees growing below, which they also strip. After changing its skin two or three times, it attains maturity about the middle of June. It is then of rather large proportions compared with the size of the little moth that follows. It stays about a fortnight in the chrysalis state rolled up in a leaf, and emerges in the perfect state in the beginning of July. Fortunately for the oaks, its ravages are over before the midsummer shoot is put forth, so that very shortly after this takes place the trees resume their customary appearance.

Among the hundreds of oak-feeding insects there is none, so far as I am aware, that commits any perceptible amount of damage, but this, in other respects, insignificant individual, which by the combination of large numbers, makes its presence so very visible. I fear that in this paper, which I have advisedly made rather short, I have not perhaps given you a learned discourse on a large subject, but I think that even these few lines will serve to point out what a vast field for inquiry lies at our very doors, for those who have inclination and leisure to take up the study of insects. I have brought with me specimens of the moth which will perhaps be of interest to some of you.

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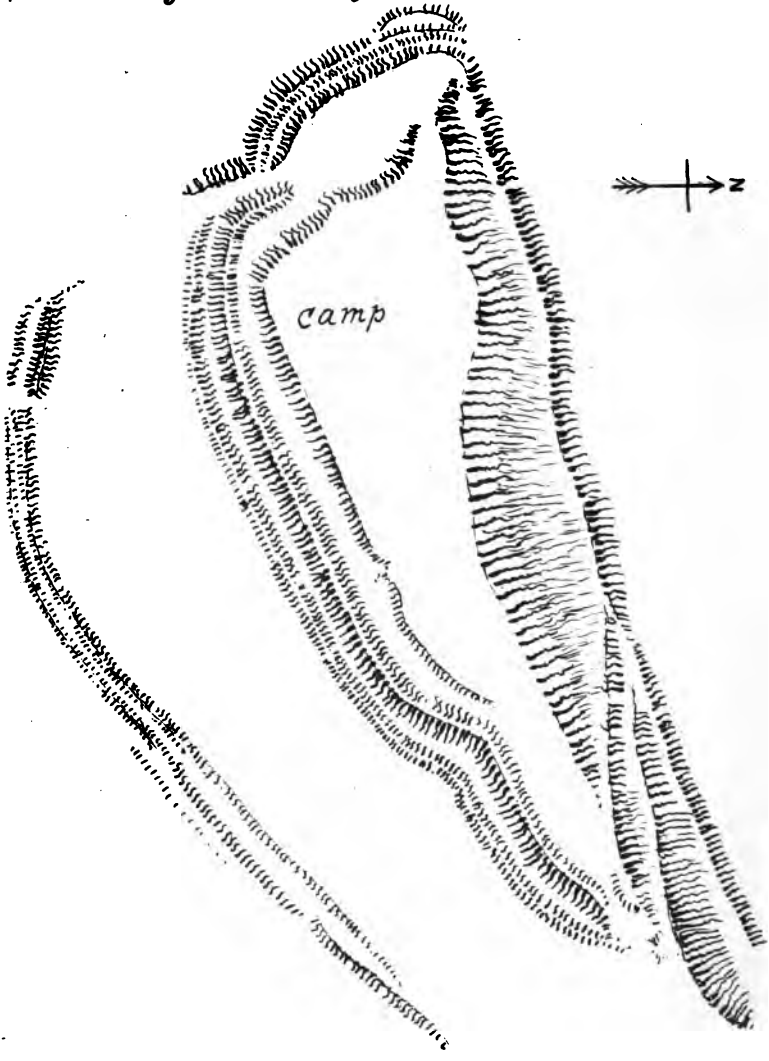
Woolhope Trans. 1881.

Croft Ambery Camp.



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Woolhope Naturalists' Field Club.

AUGUST 11TH, 1881.

THE fourth field meeting was held on Tuesday, August 11th, and was a meeting of interest to the botanists of the Club, and to all lovers of trees, and other objects of nature.

The objects laid before the members were to search for plants rare in the botany of our county, to be found in their walk over Bircher common to the celebrated chestnut trees near Croft Castle (see pp. 101 and 110 of the last Volume of Transactions), and from thence up the beautiful dingle to the Camp at Croft Ambery.

The day turned out more or less wet, and members did not muster at the railway station in very strong force. They were met at Leominster by the President (Rev. A. Ley), and Mr. B. M. Watkins, who had been out to explore the ground upon the day previous, and they proceeded by carriage to Bircher Common. Here an unsuccessful hunt was made for the *Kœhleria cristata*, under the guidance of Mr. Hutchinson, the son of the successful finder of the grass in 1860. However, botanists are never daunted by want of success in the immediate object of their search. Indeed, considering the extreme rarity of the *Kœhleria* in Herefordshire, and the lateness of the season (it being an early grass to develop), its non-discovery to-day was not to be wondered at. But naturalists know that when one good thing is missed, others are usually found, and the Lesser Bird's-foot *(Ornithopus perpusillus, L.)* another rare and local plant in Herefordshire had been secured the day before upon the Common, and was exhibited to-day.

After enjoying the lovely glades of Croft Park, and climbing the Ambery, the beauties of which could not to-day be appreciated owing to the rain, the members were joined by a fresh detachment, under the famous chestnuts, and proceeded to Aymestry. Here, on a wooded bank lying above Yatton Court, another plant rare in Herefordshire was secured, the Sheep's-bit *(Jasione montana, L.)*; as usual in scrubby and broken patches; the plant being so eagerly browsed by sheep that it is difficult to find an unmutilated specimen in any position where sheep can approach it. When the valley was reached at Yatton Court, the ditches at once showed the rare Figwort *(Scrophularia Ehrharti, Stev.)*, which is indeed in this part of Herefordshire the most common species. Aymestry is classical ground for this plant in Herefordshire; for it was here that it was first discovered by Messrs. Purchas, Crouch, and Woodhouse, in 1852.

Arrived at Aymestry, some of the members yielded to the allurements of that beautiful spot, to rest during the one-and-a-half hours which remained before returning to Leominster: but the more zealous botanists made an expedition up

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the Lugg valley, the right bank of which, overhung by a steep wooded hill, is excellent hunting ground. They were rewarded by seeing the rare *Agrimonia odorata* in great profusion and very fine growth. Here, too, several rare Brambles grow—*R. silvaticus, fusco-ater*, and *pyramidalis, Bab.*,—we depend for the correctness of the nomenclature upon the assurance of those skilled in bramble-lore—with others: *Cardamine impatiens* also, and the Willow-herbs *Epilobium roseum*, and *palustre*, the latter a scarce plant in Herefordshire, were seen. The best announcement for the day however was made by Mr. H. N. Ridley, who brought before the notice of the Club the Wood Bitter Vetch, *Vicia Orobus, D.C.*, which he had discovered in 1879, on Cusop hill: a very good addition to the Herefordshire Flora.

A pleasant return was made to Leominster, where, after dinner, the thorough and excellent paper of Mr. B. M. Watkins upon the *Flora of the Doward Hills* was read.

Kœhleria cristata, Pers. This Grass is extremely rare and local in the county of Hereford. It was found by Rev. T. Hutchinson upon the south-west side of Bircher Common in the year 1860; and this was at the time considered by Rev. W. H. Purchas to be its first discovery in Herefordshire. Subsequently however, it appeared that the *Kœhleria* had been previously discovered by Mr. B. M. Watkins as early as the year 1848, upon the Little Doward hill. These are all the records at present known of its occurrence in Herefordshire. In both these cases, the original specimens still exist, and will be placed in the County Herbarium: but in both cases the plant has been in subsequent years searched for at the same stations in vain. This plant has been recorded for the adjoining counties of Worcester, and West Gloucester, but not for any of the other counties which touch Herefordshire.

Vicia Orobus, D.C. This handsome Vetch is an inhabitant of the hilly regions of Brecon, Radnor, and Glamorgan. It is to be seen conspicuously on railway sides near Rhayader, with its beautiful spikes of showy blossom in June or July, and its large bunches of pods in August. Its distribution renders it likely to occur in the hilly western and north-western tracts of Herefordshire; but the honour of finding it belongs to Mr. H. N. Ridley, who met with it near Blaenau, on Cusop Hill, in 1879, and kindly gave a specimen to the County Herbarium. It will probably be found eventually at some other stations in the Black Mountain, Kington, and possibly the Aymestry Districts; but it is so conspicuous and beautiful a plant that it can hardly have remained so long overlooked, unless really a great rarity over the whole area of Herefordshire.

It will be observed that the two plants above noticed furnish an instance of what we find frequently in Herefordshire, viz., the combination in our border county of west-midland and Welsh types of vegetation.

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Woolhope Naturalists' Field Club.

FLORULA OF THE DOWARD HILLS,

By Mr. B. M. Watkins—August 11th, 1881.

"Westward, Great Doward, stretching wide
Upheaves his iron-bowell'd side;
And by his everlasting mound,
Prescribes th' imprison'd river's bound,
And strikes the eye with mountain force."
* * * * * *
"And where the mind repose would seek,
A barren, storm-defying peak,
The Little Doward lifted high
His rocky crown of royalty."—*Bloomfield.*

The following paper may with propriety be termed a "Florula," being intended to be a Flora on a minute scale, and to do for a very restricted area what the Local Flora is designed to accomplish on a larger scale. There is much to encourage one to take up the study of the Natural History of a very restricted district. It is capable of being worked out with much greater completeness than that of a larger area; and a single individual, or a small group of workers, may complete what, on a county scale, would need the co-operation of many.

The author of the present Florula has been working more or less at the phanerogamic botany of the Doward Hills for the past thirty-five years; it is therefore hoped that the sketch of their productions may be—at least as far as their rarer species go—tolerably complete. He has had the idea of bringing his observations into the form of a paper for only a few years past, and this must be his apology for the fact which the following lists will make apparent, that there are not a few more common plants which ought to make their appearance there, which are as yet conspicuous only for their absence. May he express a hope that what he has attempted for the Phanerogamic botany of this small area will be carried out by some of the members of this Club for the various branches of their Cryptogamic vegetation—mosses and fungi—and again for their equally interesting and varied fauna and insect life, and that thus we may possess for at least one corner of the county what I may be allowed to say the Woolhope Club should never rest until we possess for every corner of the county, a tolerably complete and reliable Natural History?

I now proceed to mark the exact topographical limitations of this Florula, which, I need not tell Herefordshire Naturalists, comprises in its narrow limits a district unique in every sort of interest which draws together the members of a Naturalists' Club. These limits are extremely simple. Beginning at the north-east, we touch it first in the centre of the village of Whitchurch, whence the turn-

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pike road from Ross to Monmouth bounds it on the north-west, until, having crossed the neck of land uniting the Dowards to the Welsh Newton hills, the road trends downwards on a sharp declivity towards Monmouth. At the nearest point to the river Wye, we leave the high road by a side road taking us to the private gas works belonging to Wyaston Leys. Here we touch the Wye, and turning up stream, walk that most beautiful of Herefordshire walks, through the gorge which divides the Doward hills from those of Stanton, and the range culminating in Symonds Yat; until after about three-and-a-half miles we arrive at the upper or Horse-ferry. At this spot, which goes by the name of "The Washings," our boundary leaves the river, and runs along the ferry road, due north till it joins the spot where we set out, in the village of Whitchurch.

Now we have beaten the bounds, let us look at the character of the the space contained within them. They comprise about 2,500 acres of singularly varied surface. A narrow rim of cultivated ground fringes the north-west; south and east, a still narrower rim of alluvial meadow, disappearing altogether in many places, runs along the river. The kernel of this thin shell is a mass of hill, with a thin soil resting for four-fifths of its area upon mountain limestone, forming two heads with a slight depression between them, which are called, respectively, the Greater and the Lesser Dowards, from the fact that the area of the Greater is between two and two-and-a-half times that of the Lesser. But the Lesser is the higher, rising to the height of about 450 feet above the river bed, and crowned on the summit by the large and well-known British camp, at the highest point of the northern circuit of which it bears the unique iron cage (40ft. high) erected by the late Mr. Blakemore as an observatory, but never finished. The whole of the Lesser Doward Hill is comprised in the Wyaston Leys estate, and has been converted into a deer park by the family of the present owner, M. Bannerman, Esq., and is strictly preserved. It *used* to be the richest of the two in botany, but the effect of its conversion into a deer park seems to have been completely to destroy all the rarer plants with one notable exception, *Atropa Belladonna*, of which rare and handsome but ill-famed plant, the steep limestone slopes of the Lesser Doward are in some seasons, a teeming thicket.

Turning now to the Greater Doward, we find its north and north-east faces taken possession of by human beings, who in times not long past have, like a swarm of bees seeking where to go, settled here, in cots, hovels, and houses, varying from indifferently good to indescribably bad. They are dotted about without order or reason, separated by small fields of no shape or size, and united by lanes leading in every direction. It is nearly impossible to find your way; but neither can you lose it for more than a few minutes; for in whatever direction you wish to go, a small lane of perhaps three feet broad opens before you. The character of this population was not, in times past, the most civilised. It is the same which has formed many other of the more recent Herefordshire hamlets, and it has stamped its recollection at many places, as, for example, at Sellack, where the hill-side settled in the same way was still, a few years ago, called "Lawless Hill." Let us hope this is, or soon will be, a thing of the past. At present many of the Doward settlements are uninhabited, the little enclosures unfilled, and the whole

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reverting to a state of nature, though the large limestone quarries worked there still employ a few families.

The above description applies to about one quarter of Great Doward; two-thirds of the remainder are untouched primitive woodland, which forms a large tract known as Lord's wood, and is now Crown property.

I need not go far into geological details, but simply observe that three-fourths of both hills are mountain limestone, breaking into cliffs and peaks from 30 to 100 feet high on the south and east faces above the river, which dominate steep and densely wooded slopes. In the middle of the mountain limestone, and occupying part of the crown of the hill, lies a tract of conglomerate and sandstone detritus, covering several acres, and producing several plants not elsewhere found within the area. Along the north runs a band of conglomerate; and outside, but still within the area, a narrow fringe of old red sandstone.

Thus it will be seen that with one exception, stagnant water, we have a little of everything—river, meadow, field, cliff, wood; sandstone, conglomerate, limestone: the limestone wood greatly predominating. As if to render the space an ideal hunting field for the naturalist, a copious stream bursts out at one spot in the limestone wood; and after forming a small bog on the top of a cliff, pours at random over the cliff, which it has covered with masses of tufa, into the river meadow below.

The whole mass of the two hills taken together has an indescribable shape; but taken separately the Lesser Doward, in its relation to its Greater, looks on the ordnance map not unlike a pear resting by its small end upon one side of an ash leaf kidney potato.

It needs to be added that no localities are given in the appended list; the reason of which will be self-evident when it is remembered how small the area of of the Florula is; and that its publication is by no means meant to aid the designs of collectors without tender fingers; still less those of individuals like one too well known in botanical story, who advertised that "having visited such or such a locality, and carefully removed every root of such or such a rarity, was now prepared to offer them for sale at such or such a price."

An analysis of the foregoing list gives us the following particulars with regard to the Doward vegetation. The total number of Phanerogamic plants sufficiently distinct from one another (whether as species, sub-species, or varieties) to have a separate name assigned to them in the *London Catalogue of British Plants*, is 652; of the 94 natural orders which comprise the British Flora, 74 being here represented. Of this total, 592 are native; four fall under Mr. Watson's class of denizens; 13 are colonists, and 27 are introduced plants. The Flora of Herefordshire is not in a sufficiently advanced state to compare their numbers accurately with those of the whole county: but in round numbers the totals for the whole county (reckoning on the same principles as above) are natives denizens and colonists; taken together about 950; introduced species 46; total, 996. This gives to the Doward hills the proportion of rather more than one-half of the whole county flora—a remarkably high average, considering their extremely restricted area.

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Looking at these numbers again, we find that 472 may be called ubiquitous or common; 163 rare or local; of which 163, the remarkable number of 14 are unique as regards Herefordshire, not occurring elsewhere in the county. The unique 14 are the following—

Hutchinsia petræa, *Br.*
Cerastium tetrandrum, *Curt.*
Hippocrepis Comosa, *L.*
Epilobium brachycarpum, *Leight.*
Sambucus laciniata.
Rubia peregrina, *L.*
Gnaphalium dioicum, *L.*
Hieracium pallidum, *Fr.*
,, lasiophyllum, *Koch.*
,, cæsium, *Fr.*
Epipactis ovalis, *Bab.*
Carex humilis, *Leysse.*
,, montana, *L.*
Melica nutans, *L.*

Of the other rarities, the following seem to deserve especial notice—

Helleborus fœtidus, *L.*
Helleborus viridis, *L.*
Cerastium semidecandrum, *L.*
Tilia grandifolia, *Ehrh.*
Rubus plicatus, *W. & N.*
Cephalanthera grandiflora, *Bab.*
,, ensifolia, *Rich.*
Sedum Telephium, *L.*
Epipactis media *Fr.*
Blysmus compresssus *Panz.*
Carex digitata, *L.*
Kœhleria cristata, *Pers.*
Hordeum sylvaticum, *Huds.*
Polypodium Robertianum, *Hoffm.*

And the introduced—

Atropa Belladonna, *L.*
Plantago Coronopus, *L.*
Poterium murieatum. *Spach.*
Aster, *Sp. (R.)*

Selecting from these, we may notice *Hutchinsia petræa* as an interesting station, forming a single stepping-stone between its scattered southern stations at Bristol and in South Wales, and its more northern home in Derbyshire. It seems to have decreased in quantity at the Dowards of late years; and the same remark has been made to me by the Rev. W. H. Purchas with regard to this plant in Derbyshire.

The two small *Cerastiums*, *tetrandrum* and *semidecandrum* are surprisingly rare in Herefordshire; the former resting upon a single specimen alone, gathered at the Doward Quarries many years ago by Mr. Purchas; and the latter being found only very sparingly at one or two spots, at long intervals both of distance and of time.

Tilia grandifolia has much interest; the limestone cliffs of the Wye valley being regarded as nearly the only locality in Britain where it is certainly wild. But its nativity is one of the knotty points; and it certainly occurs in other places in Herefordshire with quite the aspect and surroundings of a wild plant.

The *Hieracia* are decidedly a feature of the Doward rarities; the three, *pallidum*, *cæsium*, and *lasiophyllum*, being confined to this station in the county, one of them, *lasiophyllum*, being also rare throughout the whole of England. Judicious botanists, who know the difficulties of this genus, may perhaps pause before accepting these plants; this alone I feel, that these names represent *something* more than mere names for one and the same plants; *what* more, I cannot say.

The Orchids are, as might have been presumed, largely represented; the two species of *Ophrys*, *apifera* and *muscifera*, being both rare in our county. *O. mus-*

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cifera is indeed very nearly peculiar to the Dowards; one specimen alone having been found elsewhere—on the Coppet hill—last summer. Then *Epipactis ovalis* and *media*, with *Cephalanthera grandiflora* would all be unique in the Herefordshire Flora, were it not that the latter is to be met with, within a mile of the Dowards, on the other side of the river, and that Mr. Towndrow informs us that *Epipactis media* is common in the Malvern district. On the Dowards it rests upon a single specimen, picked some years ago. *Epipactis ovalis* is, we may fear, a thing of the past. It was a native of the Lesser Doward; but has disappeared with the change in the vegetation of Little Doward above alluded to.

Another feature of the Doward botany, is its rare *Carices*, *humilis*, *montana*, and *digitata*. *C. digitata* has been found recently at one or two other spots within the county; otherwise all the three would be confined to these hills.

Last, as perhaps the greatest peculiarity of all the Doward vegetation, *Atropa Belladonna* deserves especial mention. It occurs not sparingly upon both hills; but, as above mentioned, the southern slopes of the Lesser hill are sometimes a dense mass of this plant—seemingly the only one deadly enough to be proof against the deer.

It is proverbially difficult to establish a negative; and we are by no means certain that a good part of the subjoined list of common plants not found upon the Doward Hills, will not eventually be obtained from them—especially of the varieties of Bramble and Rose which need such a practised eye to discriminate. There are at present upon this list 44, the names of which here follow:—

Ranunculus hederaceus, *L.*
,, sceleratus, *L.*
Trifolium filiforme, *L.*
Vicia Bobartii, *Forst.*
Potentilla procumbens, *Sibth.*
Rubus villicaulis, *W. & N.*
,, Schlechtendalii, *W. & N.*
,, scaber, *Weihe.*
,, Lejeunii, *Weihe.*
Rosa canina, *L.*
,, ,, surculosa.
,, ,, sphærica.
,, ,, Reuteri.
Epilobium obscurum, *Schreb.*
Ribes rubrum, *L.*
Adoxa moschatellina, *L.*
Silaus pratensis, *Bers.*
Torilis infesta, *Spreng.*
,, nodosa, *Gaert.*
Scandix Pecten, *L.*
Silybum Marianum, *Gaert.*
Carduus eriophorus, *L.*
Centaurea Cyanus, *L.*
Senecio sylvaticus, *L.*
Anthemis arvensis, *L.*
Hieracium tridentatum, *Fries.*
Campanula patula, *L.*
Pedicularis sylvatica, *L.*
Lamium maculatum, *L.*
Anchusa arvensis, *Bieb.*
Chenopodium Bonus Henricus, *L.*
Rumex pratensis, *M. & K.*
Polygonum Persicaria elatum, L.
Urtica urens, *L.*
Carex lepidocarpa, *Tausch.*
,, paludosa, *Good.*
Glyceria pedicellata, *Towns.*
Festuca sciurioides, *Roth.*
Nardus stricta, *L.*
Cystopteris fragilis, *Bernh.*
Nephrodium affine, *Fisch.*
Equisetum limosum, *L.*

But in the case of the following plants, it may be accepted with tolerable assurance, amounting in many cases almost to a moral certainty, that they are *not*

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inhabitants of the Doward hills; since they are plants easily recognisable, which have been searched for on the Dowards over and over again without success.

List of remarkable plants, known to grow in the immediate vicinity of the Dowards, under conditions exactly reproduced at the Dowards, but never found there.

Name	Where found	Distance from Dowards
Ranunculus parviflorus, *L.*	... Huntsham, Herefordshire	... ½ mile
Berberis vulgaris, *L.*	... Coldwell rocks, West Gloucester	1½ ,,
Rubus saxatilis, *L.*	... ,, ,, ,,	... 1 ,,
Pyrus latifolia, *Syme, M.S.*	... Coldwell and Staunton Woods, West Gloucester	... ½ ,,
Filago minima, *Fr.*	... Huntsham, Herefordshire	... ½ ,,
Pyrola minor, *L.*	... Staunton woods, West Gloucester	1½ ,,
Calamintha Nepeta, *Clairv.*	... Staunton, West Gloucester	... 1½ ,,
Cynoglossum montanum, *Lam.*	... Coldwell woods, West Gloucester	1 ,,
Euphorbia Lathyris, *L.*	... Welsh Bicknor, Herefordshire	... 2 ,,
Polygonatum officinale, *All.*	... Coldwell woods, West Gloucester	1 ,,
Brachypodium pinnatum, *Beauv.*	... Coppet hill, Herefordshire	... 2½ ,,
Cystopteris fragilis, *Bernh.*	... Symonds' Yat, West Gloucester	½ ,,
Nephrodium æmulum, *Baker*	... ,, ,,	? Quite near.

In saying that these plants are not inhabitants of the Dowards it is not intended to imply that they never have been, or that they never will be. It is well known, that plant-life, like all other life, is perpetually on the move; and what is more probable, than that, for example, *Pyrus latifolia*, which is so remarkable an inhabitant of the Coldwell and Staunton woods, will be wafted across the river gorge by some of those wings which Nature knows so well how to give, and spring up, a real new Native, of Doward and Herefordshire? And so of the rest. Still, they have not got there yet.

There are a few other plants which have been searched for on these hills with a fainter and more distant hope, which has never been realised. For example, *Arabis stricta*, and the other rarities of S. Vincent's rocks, because associated with *Hutchinsia petræa: Carex ornithopoda*, because associated with the same plant in Derbyshire: *Valeriana Mikanii*, because inhabiting the limestone cliffs of the Wye valley at Wyndcliff.

But it is enough. To mention all that botanists *hope* to find would involve ourselves in ridicule, and detain you all night. We will only thank you for listening to the story of what we have found; and assure you in the words of the revered Fries, that there is plenty of work left for you to do—

"Quamvis multas plantas per multos annos observaverim, me tamen omnes observasse non confido."

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DICOTYLEDONES.

By Mr. B. M. WATKINS.

The names of Plants in this List are arranged in accordance with the *London Catalogue of British Plants*, 7th edition.

1.—Nat. order. Ranunculaceæ.

CLEMATIS.

1. C. Vitalba, *Linn.* *Travellers' Joy. Honesty. Virgin's Bower.*

THALICTRUM.

2. T. flavum, *Linn.* *Common Meadow Rue.*

ANEMONE.

3. A. nemorosa, *Linn.* *Wood Anemone. Wind flower.*

RANUNCULUS.

4. R. fluitans, *Linn.* *Floating Water Crow-foot.*
5. R. peltatus, *Fries.*
6. R. sceleratus, *Linn.* *Celery-leaved Crow-foot.*
7. R. Flammula, *Linn.* *Lesser Spear-wort.*
8. R. auricomus, *Linn.* *Wood Crow-foot.*
9. R. acris, *Linn.* *Upright meadow Crow-foot.*
10. R. repens, *Linn.* *Creeping Crow-foot.*
11. R. bulbosus, *Linn.* *Bulbous Crow-foot.*
12. R. Ficaria, *Linn.* *Celandine. Pile-wort.*

". . . . The first gilt thing
That wears the trembling pearls of Spring."

CALTHA.

13. C. palustris, *Linn.* *Marsh Marigold. Gowan (Scotch).*

"While on burn banks the yellow Gowan grows,
Or wandering lambs rin bleating after ewes,
His fame shall last."

HELLEBORUS.

14. H. viridis, *Linn.* *Green Hellebore.*
15. H. fœtidus, *Linn.* *Stinking Hellebore.*

Formerly abundant in woods on Great Doward, but now rare.

AQUILEGIA.

16. A. vulgaris, *Linn.* *Columbine.*

4.—Nat. order. Papaveraceæ.

PAPAVER.

17. P. Rhœas, *Linn.* *Field Poppy.*
18. P. dubium, *Linn.* *Long Smooth-headed Poppy.*
19. P. Argemone, *Linn.* *Long-headed rough Poppy.*

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CHELIDONIUM.

20. C. majus, *Linn.* *Common Celandine. Titterwort. Calidony.*

The flower of this plant and the swallow are said to appear about the same time.

Fumariaceæ.

CORYDALUS.

21. C. lutea, *D.C.* *Yellow Fumitory.*

FUMARIA.

F. pallidiflora, var. Borœi, *Jord.*

22. F. officinalis, *Linn.* *Common Fumitory.*

5.—Nat. order. Cruciferæ.

RAPHANUS.

23. R. Raphanistrum, *Linn.* *Jointed Charlock.*

SINAPIS.

24. S. arvensis, *Linn.* *Wild Mustard. Charlock.*
25. S. alba, *Linn.* *White Mustard.*
26. S. nigra, *Linn.* *Black Mustard.*

BRASSICA.

27. B. campestris, *L.* *Common Wild Navew.*

SISYMBRIUM.

28. S. officinale, *Scop.* *Officinal Hedge Mustard.*
29. S. Alliaria, *Scop.* *Hedge Garlic. Jack-by-the-Hedge. Sauce Alone.*

CARDAMINE.

30. C. pratensis, *L.* *Cuckoo Flower. Lady's Smock.*
31. C. hirsuta, *L.* *Hairy Marsh Bitter Cress.*
32. C. sylvatica, *L.* *Wood Bitter Cress.*
33. C. impatiens, *L.* *Narrow-leaved Lady's Smock.*

ARABIS.

34. A. thalianum, *L.* *Wall Cress. Thale Cress.*
35. A. hirsuta, *Brown.* *Hairy Rock Cress.*

BARBAREA.

36. B. vulgaris, *Brown.* *Common Winter Cress.*

NASTURTIUM.

37. N. officinale, *Br.* *Water Cress.*
38. N. sylvestre, *Br.* *Wild Cress.*
39. N. palustre, *D.C.* *Land Cress.*

ARMORACIA.

40. A. *rusticana*, *Bab. Man.* *Horse Radish.*

DRABA.

41. D. verna, *L.* *Common Whitlow Grass.*

THLASPI.

42. T. arvense, *L.* *Penny Cress.*

HUTCHINSIA.

43. H. petræa, *Brown.* *Rock Hutchinsia.*

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This rare plant, most abundant a few years since, has become very scarce, and probably in a short time will entirely disappear.

CAPSELLA.

44. Bursa-pastoris, *Mœnch.* *Shepherd's Purse.*

LEPIDIUM.

45. L. campestre, *Brown.* *Field Mustard.*

46. L. Smithii, *Hook.* *Smith's Pepperwort.*

6.—Nat. order. Resedaceæ.

RESEDA.

47. R. luteola, *Linn.* *Dyer's Rocket. Weld. Mignionette.*

7.—Nat. order. Cistaceæ.

HELIANTHEMUM.

48. H. vulgare, *Gært.* *Common Rock Rose.*

8.—Nat. order. Violaceæ.

49. V. odorata, *Linn.*

b. alba. *Sweet Violet.*

50. V. permixta, *Jord.* *(Mr. Southall.)*

51. V. hirta, *Linn.* *Hairy Violet.*

A curious form of this species grows upon Great Doward, with small flowers, without a spur.

52. V. sylvatica, *Fries.*

a. Riviniana.

b. Reichenbachiana.

53. V. tricolor, *Linn.* *Heart's-ease. Cupid's Flower. Pansy.*

10.—Nat. order. Polygalaceæ.

POLYGALA.

54. P. vulgaris, *Linn.* *Milkwort.*

12.—Nat. Order. Caryophyllaceæ.

SAPONARIA.

55. S. officinalis, *Linn.* *Common Soapwort.*

SILENE.

56. S. inflata, *Sm.* *Bladder Catchfly.*

LYCHNIS.

57. L. vespertina, *Sibth.* *White Campion.*

58. L. diurna, *Sibth.* *Red Campion.*

59. L. Flos-cuculi, *Linn.* *Ragged Robin. Cuckoo Flower.*

60. L. Githago, *Linn.* *Corn Cockle.*

CERASTIUM.

61. C. semidecandrum, *Linn.* *Little Mouse-ear Chickweed.*

62. C. glomeratum, *Thuil.* *Broad-leaved Mouse-ear Chickweed.*

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63. C. triviale, *Link.* *Narrow-leaved Mouse-ear Chickweed.*
64. C. tetrandrum, *Curt.* *Four-cleft Mouse-ear Chickweed.*

One plant found by the *Rev. W. H. Purchas.*

STELLARIA.

65. S. aquatica, *Scop.* *Water Chickweed.* *Water Stitchwort.*
66. S. media, *With.* *Common Chickweed.*
67. S. Holostea, *Linn.* *Greater Stitchwort.*
68. S. graminea, *Linn.* *Grassy-leaved Stitchwort.*
69. S. uliginosa, *Murr.* *Bog Stitchwort.*

ARENARIA.

70. A. trinervis, *Linn.* *Plantain-leaved Sandwort.*
71. A. serpyllifolia, *L.* *Thyme-leaved Sandwort.*
    b. leptoclados.

SAGINA.

72. S. procumbens, *L.* *Procumbent Pearlwort.*
73. S. apetala, *L.* *Erect Pearlwort.*

SPERGULA.

74. S. arvensis, *L.* *Corn Spurrey.*

SPERGULARIA.

75. S. rubra, *Fenzl.* *Purple Sandwort,—Rev. A. Ley.*

12.—Nat. order. Illecebraceæ.

SCLERANTHUS.

76. S. annua, *Linn.* *Annual Knawel.*

16.—Nat. order. Hypericaceæ

77. H. Androsæmum, *L.* *Tutsan.*
78. H. perforatum, *L.* *Perforated St. John's Wort.*
79. H. tetrapterum, *Fr.* *Square-stalked St. John's Wort.*
80. H. dubium, *Leers.*
    b. maculatum. *Imperforated St. John's Wort.*
81. H. humifusum, *L.* *Trailing St. John's Wort.*
82. H. pulchrum, *L.* *Elegant St. John's Wort.*
83. H. montanum, *L.* *Mountain St. John's Wort.*
84. H. hirsutum, *L.* *Hairy-stalked St. John's Wort.*

17.—Nat. order. Malvaceæ.

MALVA.

85. M. moschata, *L.* *Musk Mallow.*
86. M. sylvestris, *L.* *Common Mallow.*
87. M. rotundifolia, *L.* *Dwarf Round-leaved Mallow.*

18.—Nat. order. Tiliaceæ.

TILIA.

88. T. parvifolia, *Ehrh.* *Small-leaved Lime Tree.*

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89. T. grandifolia, *Ehrh.* *Large-leaved Lime Tree.*

19.—Nat. order. Linaceæ.

LINUM.

90. L. catharticum, *L.* *Purging Flax.*
91. L. angustifolium, *Huds.* *Narrow-leaved Flax.*

20.—Nat. order. Geraniaceæ.

GERANIUM.

92. G. sanguineum, *L.* *Red Crane's-bill.*
93. G. pratense, *L.* *Meadow Crane's-bill.*
94. G. molle, *L.* *Common Dove's-foot Crane's-bill.*
95. G. pusillum, *L.* *Small-flowered Crane's-bill.*
96. G. dissectum, *L.* *Dove's-foot.*
97. G. lucidum, *L.* *Shining-leaved Crane's-bill.*
98. G. columbinum, *L.* *Long-stalked Crane's-bill.*
99. G. Robertianum, *L.* *Herb Robert.*
    G. striatum, *L.* *Striated Geranium.*

ERODIUM.

100. E. cicutarium, *Herit.* *Hemlock-leaved Stork's-bill.*

OXALIS.

101. O. Acetosella, *Linn.* *Wood-sorrel.*

21.—Nat. order. Ilicaceæ.

ILEX.

102. I. Aquifolium, *L.* *Common Holly.*

22.—Nat. order. Celastraceæ.

EUONYMUS.

103. E. europæus, *L.* *Spindle Tree.*

23.—Nat. order. Rhamnaceæ.

RHAMNUS.

104. R. catharticus, *L.* *Purging Buckthorn.*
105. R. Frangula, *L.* *Alder Buckthorn.*

24.—Nat. order. Sapindaceæ.

ACER.

106. A. Pseudo-platanus, *L.* *Sycamore.*
107. A. campestre, *L.* *Field Maple.*

25.—Nat. order. Leguminiferæ.

ULEX.

108. U. europæus, *L.* *Gorse. Whin. Furze.*
109. U. Gallii, *Planchon.* *Gorse.*

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GENISTA.

110. G. tinctoria, *L.* *Woad-waxen. Dyer's Green Weed.*

SAROTHAMNUS.

111. S. scoparium, *Koch.* *Common Broom.*

ONONIS.

112. O. arvensis, *L.* *Rest-harrow. Cammock.*

MEDICAGO.

113. M. lupulina, *L.* *Black Medick. None-such.*

ANTHYLLIS.

114. A. vulneraria, *L.* *Lady's-fingers. Kidney Vetch,—Rev. W. H. Purchas.*

TRIFOLIUM.

115. T. pratense, *L.* *Purple Clover.*
116. T. medium, *L.* *Zigzag Clover.*
117. T. hybridum, *L.* *Alsike Clover.*
118. T. strictum, *L.* *Soft Knotted Trefoil.*
119. T. repens, *L.* *White Clover. Dutch Clover.*
120. T. procumbens, *L.* *Hop Trefoil.*
121. T. minus, *L.* *Lesser Yellow Trefoil.*

LOTUS.

122. L. corniculatus, *L.* *Common Bird's-foot Trefoil.*
var. villosus
123. L. major, *Scop.* *Large Bird's-foot Trefoil.*

HIPPOCREPIS.

124. H. comosa, *L.* *Horseshoe Vetch,—Mr. A. T. Willmott.*

ONOBRYCHIS.

125. O. sativa, *L.* *Sainfoin.*

ORNITHOPUS.

126. O. perpusillus, *L.* *Bird's-foot.*

VICIA.

127. V. hirsuta, *Koch.* *Hairy-podded Tare.*
128. V. tetrasperma, *Mœnch.* *Smooth-podded Tare.*
129. V. sepium, *L.* *Bush Vetch.*
130. V. sativa, *L.* *Common Vetch.*
131. V. angustifolia, *Roth.* *Narrow-leaved Vetch.*
132. V. cracca, *L.* *Tufted Vetch.*

LATHYRUS.

133. L. pratensis, *L.* *Meadow Vetchling.*

OROBUS.

134. O. tuberosus. *L.* *Common Bitter Vetch. Heath Pea.*
var. tenuifolius.

26.—Nat. order. Rosaceæ.

PRUNUS.

135. P. spinosa, *Linn.* *Sloe. Blackthorn.*
136. P. insititia, *Linn.* *Wild Bullace Tree.*

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137. P. *domestica, Linn.* *Wild Plum Tree.*
138. P. avium, *Linn.* *Wild Cherry.*

SPIRÆA.

139. S. Ulmaria, *L.* *Meadow Sweet.*
140. S. Filipendula, *L.* *Drop-wort.*

AGRIMONIA.

141. A. Eupatoria, *L.* *Common Agrimony.*
142. A. odorata, *Miller.* *Agrimony,—Prof. Babington.*

POTERIUM.

143. P. sanguisorba, *L.* *Common Salad Burnet.*
144. P. muricatum, *Spach.* *Warty-fruited Burnet,—Rev. W. H. P.*

This plant has, I fear, disappeared.

ALCHEMILLA.

145. A. vulgaris, *L.* *Common Lady's Mantle.*
146. A. arvensis, *Scop.* *Parsley Piert.*

POTENTILLA.

147. P. Fragariastrum, *Ehrh.* *Barren Strawberry.*
148. P. Tormentilla, *Schenk.* *Common Tormentil.*
149. P. reptans, *L.* *Creeping Cinquefoil.*
150. P. anserina, *L.* *Silver weed. Pansy.*
151. P. argentea, *L.* *Hoary Cinquefoil,—Rev. A. Ley.*

FRAGARIA.

152. F. vesca, *L.* *Wild Strawberry.*

I have gathered plants in this locality closely approaching to *F. elatior.*

RUBUS.

153. R. Ideus, *L.* *Wild Raspberry.*
154. R. plicatus, *W. & N.* *Upright Bramble.*
155. R. Lindleianus, *Lees.* *Shining-leaved Bramble,—Rev. A Ley.*
156. R. imbricatus, *Hort.*
157. R. rhamnifolius, *W. & N.* *Buckthorn-leaved Bramble.*
158. R. discolor, *W. & N.* *Common Blackberry.*
159. R. leucostachys, *Sm.* *White clustered Bramble.*
    b. vestitus.
160. R. Borreri, *Bell Salter,—Rev. A. Ley.*
    b. Sprengellii, *Weihe.*
161. R. Hystrix, *Weihe.*
162. R. Macrophyllys, *Weihe.*
    d. amplificatus.
163. R. rosaceus, *Weihe.*
164. R. rudis, *Weike.*
165. R. Kochleri, *Weihe.* *Kochler's Bramble.*
    c. pallidus.
166. R. diversifolius, *Lindl.*
167. R. pyramidalis, *Bab.* *Pyramidal Bramble.*
168. R. Guntheri, *Weike.* *Gunther's Bramble.*

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169. R. humifusus, *Weike.* *Prof. Babington.*
170. R. glandulosus, *Bell.*
a. Bellardi. *Bellard's Bramble.*
b. hirtus, *W. & N.*
c. Reuteri, *Rev. A. Ley.*
171. R. corylifolius, *Sm.* *Hazel-leaved Bramble.*
172. R. tuberculatus, *Bab.*
173. R. cæsius, *Linn.* *Dewberry.*
c. ulmifolius, *Rev. A. Ley.*
d. intermedius, *Rev. A. Ley.*

Most of the Brambles in this list have been named by competent authorities, and I believe that careful investigation would increase the number of species and varieties of this perplexing genus.

GEUM.

174. G. urbanum, *L.* *Herb Bennett.* *Common Avens.*

ROSA.

175. R. micrantha, *Sm.* *Small-flowered Sweet Briar.*
176. R. tomentosa, *Sm.* *Downy-leaved Rose.*
177. R. canina, *L.* *Dog Rose.*
a. lutetiana.
d. senticosa.
e. dumalis.
g. urbica.
h. frondosa.
obtusifolia.
i. arvatica.
j. dumetorum.
m. tomentella.
r. andegavensis.
p. collina.
u. subcristata,—*Rev. A. Ley.*
178. R. arvensis, *Huds.* *Field Rose.*

CRATÆGUS.

179. C. Oxyacantha, *Linn.* *b.* monogyna.

PYRUS.

179A. P. communis, *L.* *Wild Pear Tree,—Rev. A. Ley.*
180. P. torminalis, *Ehrh.* *Wild Service Tree.*
181. P. rupicola, *Syme.* *E. B.* *Rev. W. H. Purchas.*
182. P. Aria, *Hudson.* *White Beam Tree.*
183. P. Aucuparia, *Gaert.* *Mountain Ash.* *Rowan Tree.*

> "Mountain Ash no eye can o'erlook . . . .
> Decked with autumnal berries that outshine
> Spring's richest blossoms."

184. P. malus, *L.* *Crab Apple.*
b. mitis.

27.—Nat. order. Lythraceæ.

LYTHRUM.

185. L. Salicaria, *L.* *Purple Willow Herb.*

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28.—Nat. order. Onagraceæ.

EPILOBIUM.

186. E. angustifolium, *Linn.* *French Willow Herb.*
b. brachycarpum,—*Rev. A. Ley.*
187. E. hirsutum, *Linn.* *Woolly Willow Herb. Codlings and Cream.*
188. E. parviflorum, *L.* *Small-flowered Willow Herb.*
189. E. montanum, *Linn.* *Mountain Willow Herb.*

CIRCÆA.

190. C. lutetiana, *Linn.* *Enchanter's Night shade.*
var. approaching intermedia—*Rev. A. Ley.*

28.—Nat. order. Halorgiaceæ.

MYRIOPHYLLUM.

191. M. spicatum, *L.* *Water Milfoil. Feather-weed.*

CALLITRICHE.

C. stagnalis, *Scop.*
b. platycarpa.

29.—Nat. order. Cucurbitaceæ.

BRYONIA.

192. B. dioica, *Linn.* *White Bryony.*

30.—Nat. order. Grossulariaceæ.

RIBES.

193. R. Grossularia, *Linn.* *Gooseberry.*
194. R. alpinum, *L.* *Mountain Currant.*
194A. R. nigrum, *Linn.*

31.—Nat. order. Crassulaceæ.

SEDUM.

195. S. Telephium, *Linn.* *a.* purpurascens. *Orpine. Live-long. Everlasting.*
S. *spurium. Breb.*
196. S. acre, *L.* *Biting Stone crop.*
197. S. reflexum, *L.* *Crooked Yellow Stone crop.*
198. S. rupestre, *Huds.* *Rock Stone crop,—Rev. A. Ley.*
This plant is reported to have been introduced here from Cheddar.
199. S. Forsterianum, *Sm.* *Welsh Rock Stone crop,—Rev. A. Ley.*

COTYLEDON.

200. C. Umbilicus, *Linn.* *Navel Wort.*

32.—Nat order. Saxifragaceæ.

SAXIFRAGE.

201. S. tridactylites, *Linn.* *Rue-leaved Saxifrage.*

CHRYSOSPLENIUM.

202. C. oppositifolium, *Linn.* *Opposite-leaved Golden Saxifrage,*

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33.—Nat. order. Umbelliferæ.

SANICULA.

203. S. europæa, *Linn.* *Wood Sanicle.*

HELOSCIADIUM.

204. H. nodiflorum, *Koch.* *Procumbent Marsh-wort.*

SISON.

205. S. Amomum, *L.* *Hedge Hone-wort.*

ÆGOPODIUM.

206. Æ. Podagraria, *L.* *Common Gout-weed.*

BUNIUM.

207. B. flexuosum, *With.* *Earth-nut. Pig-nut.*

PIMPINELLA.

208. P. Saxifraga, *L.* *Common Burnet Saxifrage.*

Also, a form of this plant, agreeing with specimens from Shropshire, named by the Rev. W. A. Leighton "poteriifolia."

ŒNANTHE.

209. Œ. crocata, *Linn.* *Water Hemlock.*

ÆTHUSA.

210. Æ. Cynapium, *L.* *Dog's Parsley. Fool's Parsley.*

FŒNICULUM.

211. F. vulgare, *Gaert.* *Fennel.*

Probably a garden escape.

ANGELICA.

212. A. sylvestris, *L.* *Wild Angelica.*

HERACLEUM.

213. H. Sphondylium, *Linn.* *Cow-parsnip.*

TORILIS.

214. T. Anthriscus, *Gaert.* *Upright Hedge Parsley.*

DAUCUS.

215. D. carota, *Linn.* *Wild Carrot.*

CHÆROPHYLLUM.

216. C. sylvestre, *L.* *Wild Chervil.*

217. C. temulum, *Linn.* *Hare's Parsley.*

CONIUM.

218. C. maculatum, *L.* *Hemlock.*

34.—Nat. order. Araliaceæ.

HEDERA.

219. H. Helix, *Linn.* *Ivy.*

35.—Nat. order. Cornaceæ.

CORNUS.

220. C. sanguinea, *L.* *Dogwood. Cornel Tree.*

Digitized by Google

36.—Nat. order. Loranthaceæ.

VISCUM.

221. V. album. *L.* *Mistletoe.*

"The damsel donned her kirtle sheen;
The hall was dressed with Holly green;
Forth to the wood did merry men go,
To gather in the Mistletoe."

37.—Nat. order. Caprifoliaceæ.

SAMBUCUS.

222. S. nigra, *L.* *Common Elder.*
var. laciniata.

VIBURNUM.

223. V. Lantana, *L.* *Wayfaring Tree.*

LONICERA.

224. L. Periclymenum, *L.* *Honeysuckle.*

38.—Nat. order. Rubiaceæ

RUBIA.

225. R. peregrina, *L.* *Wild Madder.*

GALIUM.

226. G. cruciatum, *With.* *Cross-wort.*
227. G. verum, *Linn.* *Lady's Bed Straw.*
228. G. Mollugo, *Linn.* *Great Hedge Bed Straw.*
229. G. saxatile, *Linn.* *Mountain Bed Straw.*
230. C. palustre, *L.* *Marsh Goose Grass.*
231. G. Aparine, *L.* *Goose-grass. Cleavers.*

ASPERULA.

232. A. odorata, *L.* *Scented Woodruff.*

SHERARDIA.

233. S. arvensis, *L.* *Field Madder.*

39.—Nat. order. Valerianaceæ.

VALERIANA.

234. V. sambucifolia, *Mikan.* *Common Valerian.*
235. V. dioica, *L.* *Marsh Valerian.*

VALERIANELLA.

236. V. olitoria, *Mœnch.* *Lamb's Lettuce.*
237. V. dentata, *Koch.* *Corn Salad.*

40.—Nat. order. Dipsaceæ.

DIPSACUS.

238. D. sylvestris, *Linn.* *Teazel.*
239. D. pilosus, *Linn.* *Shepherd's Teazel.*

SCABIOSA.

240. S. succisa, *L.* *Devil's-bit Scabious.*

Digitized by Google

A tradition existed that the Devil was induced, in consequence of the supposed medicinal virtues of the root of this plant, to bite it off, and thus deprive man of its benefits, which is said to account for its singular præmorse appearance. —Gerard's *Herbal*, 1597.

241. S. columbaria, *L.* *Mountain Scabious.—Rev. A. Ley.*
242. S. arvensis, *L.* *Field Scabious.*

41.—Nat. order. Compositæ.

CARDUUS.

243. C. nutans, *L.* *Nodding Thistle.*
244. C. crispus, *L.* *Welted Thistle.*
245. C. lanceolatus, *L.* *Spear Thistle.*
246. C. palustris, *L.* *Marsh Thistle.*
247. C. acaulis, *L.* *Dwarf Thistle.—Rev. W. H. Purchas.*
248. C. arvensis, *L.* *Field Thistle.*

CARLINA.

249. C. vulgaris, *L.* *Common Carline Thistle.*

ARCTIUM.

250. A. majus, *Schkuhr.* *Great Burdock.*
251. A. minus, *Schkuhr.* *Lesser Burdocks.*
252. A. intermedium, *Lange.* *Intermediate Burdock.—Rev. A. Ley.*
253. A. nemorosum, *Lej.*

SERRATULA.

254. S. tinctoria, *Linn.* *Saw-wort.*

CENTAUREA.

255. C. nigra, *L.* *Black Knapweed.*
256. C. Scabiosa, *L.* *Great Knapweed. Matfellow.*

CHRYSANTHEMUM.

257. C. Leucanthemum, *L.* *Great Ox-eye Daisy.*

MATRICARIA.

258. M. Parthenium, *L.* *Feverfew.*
259. M. inodora, *L.* *Scentless Feverfew.*
260. M. Chamomilla, *L.* *Wild Chamomile.*

TANACETUM.

261. T. vulgare, *L.* *Common Tansy.*

ANTHEMIS.

262. A. Cotula, *L.* *Stinking Mayweed.*

ACHILLEA.

263. A. Millefolium, *L.* *Mil-foil Yarrow.*
264. A. Ptarmica, *L.* *Sneezewort.*

ARTEMISIA.

265. A. Absinthium, *L.* *Common Wormwood.*
266. A. vulgaris, *L.* *Mugwort.*

FILAGO.

267. F. germanica, *L.* *Erect Cudweed.*

Digitized by Google

GNAPHALIUM.

268. G. uliginosum, *L.* *Cudweed.*
269. G. sylvaticum, *L.* *Upright Cudweed.*
270. G. norvegicum, *Gunn.*

Growing in several places on Great Doward.

270A. G. dioicum, *L.* *Mr. E. H. Farr.*

SENECIO.

271. S. vulgaris, *L.* *Groundsel.*
272. S. erucifolius, *L.* *Hoary Ragwort.*
273. S. Jacobæa, *L.* *Ragweed. Ragwort.*
274. S. aquaticus, *Huds.* *Water Ragwort.*

INULA.

275. I. Conyza, *D.C.* *Ploughman's Spikenard.*
276. I. dysenterica, *L.* *Common Fleabane.*

BELLIS.

277. B. perennis, *L.* *Daisy.*

ERIGERON.

278. E. acris, *L.* *Blue Fleabane.*

SOLIDAGO.

279. S. Virga-aurea, *L.* *Golden Rod.*

TUSSILAGO.

280. T. Farfara, *Linn.* *Colt's Foot.*

PETASITES.

281. P. vulgaris, *Desf.* *Common Butter bur.*

EUPATORIUM.

282. E. cannabinum, *L.* *Hemp Agrimony.*

LAPSANA.

283. L. communis, *L.* *Nipplewort.*

HYPOCHÆRIS.

284. H. radicata, *L.* *Long-rooted Cat's-ear.*

LEONTODON.

285. L. hirtus, *L.* *Rough Thrincia.*
286. L. hispidus, *L.* *Rough Hawk-bit.*
287. L. autumnalis, *L.* *Autumnal Hawk-bit.*

PICRIS.

288. P. hieracioides, *L.* *Hieracium-leaved Ox tongue.*

TRAGOPOGON.

289. T. pratensis, *L.* *Meadow Goat's Beard. Jack-go-to-bed-at-noon.*

TARAXACUM.

290. T. officinale, *Wigg.* *Dandelion.*
b. lævigatum, *Rev. A. Ley.*

LACTUCA.

291. L. virosa, *L.* *Acrid Lettuce, Mr. A. T. Willmott.*
292. L. muralis, *Fresen.* *Wall Lettuce.*

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CREPIS.

293. C. virens, *L.* *Smooth Crepis.*

SONCHUS.

294. S. oleraceous, *L.* *Sow Thistle.*

294A. S. asper, *Hoffm.* *(Rev. A. Ley.)*

295. S. arvensis, *L.* *Field Sow Thistle.*

HIERACIUM.

296. H. Pilosella, *L.* *Mouse-ear Hawkweed.*

297. H. pallidum, *Fries.* *Rev. W. H. Purchas.*

298. H. lasiophyllum, *Koch.* *Rev. A. Ley.*

299. H. murorum, *L.* *Mural Hawkweed.*

300. H. cæsium, *Fries.* *Spotted-leaved Hawkweed.*

301. H. vulgatum, *Fries.* *Hawkweed.*

302. H. umbellatum, *Linn.* *Narrow-leaved Hawkweed.*

303. H. boreale, *Fries.* *Broad-leaved Hawkweed.*

ASTER.

A species of, grows luxuriantly on several parts of Great Doward.

42.—Nat. order. Campanulaceæ.

CAMPANULA.

304. C. Trachelium, *L.* *Nettle-leaved Bell-flower.*

305. C. latifolia, *L.* *Broad-leaved Bell-flower.*

306. C. rotundifolia, *L.* *Nodding-flowered Harebell.*

43.—Nat. order. Ericaceæ.

VACCINIUM.

307. V. Myrtillus, *L.* *Bilberry. Whortleberry. Wimberry.*

CALLUNA.

308. C. vulgaris, *Salisb.* *Common Ling.*

MONOTROPA.

309. M. Hypopitys, *L.* *Fir-tree Bird's Nest.*

44.—Nat. order. Jasminaceæ.

FRAXINUS.

310. F. excelsior, *L.* *Common Ash.*

LIGUSTRUM.

311. L. vulgaris, *L.* *Common Privet.*

46.—Nat. order. Gentianaceæ.

ERYTHRÆA.

312. E. Centaurium, *Pers.* *Centaury.*

CHLORA.

313. C. perfoliata, *L.* *Perfoliate Yellow Wort.*

GENTIANA.

314. G. Amarella, *L.* *Autumnal Gentian.*

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48.—Nat. order. Convolvulaceæ.

CONVOLVULUS.

315. C. arvensis, *L.* *Small Bindweed.*
316. C. sepium, *L.* *Great Bindweed.*

49.—Nat. order. Solanaceæ.

SOLANUM.

317. S. Dulcamara, *L.* *Woody Nightshade. Bittersweet.*
318. S. nigrum, *L.* *Black Nightshade, Rev. A. Ley.*

ATROPA.

319. A. Belladonna, *L.* *Dwale. Deadly Nightshade.*

This poisonous plant, formerly used as a cosmetic, is now of very great medicinal repute.

"Or have we eaten of the insane root,
That takes the reason prisoner?"

50.—Nat. order. Scrophulariaceæ.

SCROPHULARIA.

320. S. Balbisii, *Hornem.* *Water Figwort.*
321. S. nodosa, *L.* *Knotty-rooted Figwort.*

VERBASCUM.

322. V. Thapsus, *L.* *Taper Moth Mullein.*
323. V. virgatum, *With.* *Large-flowered Primrose-leaved Mullein.*

DIGITALIS.

324. D. purpurea, *L.* *Foxglove. Witches Thimble. Fairy Cap. Fairy Petticoat. Fairy Glove.*

LINARIA.

325. L. *Cymbalaria, Mill.* *Wall Toad Flax.*
326. L. vulgaris, *Mill.* *Common Toad Flax.*
327. L. minor, *Desf.* *Little Toad Flax. Rev. W. H. Purchas.*

VERONICA.

328. V. hederifolia, *L.* *Ivy-leaved Speedwell.*
329. V. polita, *Fries.* *Grey field Speedwell.*
330. V. agrestis, *L.* *Green field Speedwell.*
331. V. Buxbaumii, *Ten.* *Buxbaum's Speedwell.*
332. V. arvensis, *L.* *Wall Speedwell.*
333. V. serpyllifolia. *Thyme-leaved Speedwell.*
334. V. officinalis, *L.* *Common Speedwell.*
335. V. montana, *L.* *Mountain Speedwell.*
336. V. Chamædrys, *L.* *Germander Speedwell. Angels' Eyes.*
337. V. Anagallis, *L.* *Water Speedwell.*
338. V. Beccabunga, *L.* *Brooklime.*

EUPHRASIA.

339. E. officinalis, *L.* *Eyebright.*

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BARTSIA.

340. B. Odontites, *Huds.* *Red rattle.*
a. verna.
b. serotina.

RHINANTHUS.

341. R. Crista-galli, *L.* *Yellow Rattle.*

MELAMPYRUM.

342. M. pratense, *L.* *Meadow Cow-wheat.*

51.—Nat. order. Orobanchaceæ.

LATHRÆA.

343. L. squamaria, *Linn.* *Tooth-wort.*

OROBANCHE.

344. O. major, *L.* *Tall Broom Rape.*
345. O. minor, *L.* *Lesser Broom Rape.*

52.—Nat. order. Verbenaceæ.

VERBENA.

346. V. officinalis, *L.* *Vervain.*

53.—Nat. order. Labiateæ.

LYCOPUS.

347. L. europæus, *L.* *Gipsy-wort.*

MENTHA.

348. M. rotundifolia, *L.* *Round-leaved Mint.*
349. M. sylvestris, *L.* *Horse Mint.*
c. mollissima.
350. M. *viridis*, *L.* *Spearmint.*
351. M. Piperita, *L.* *Peppermint.*
352. M. hirsuta, *L.* *Capitate Mint.*
b. var. subglabra, *Rev. A. Ley.*
353. M. sativa, *L.* *Meadow Mint.*
c. paludosa, *Rev. W. H. Purchas.*
354. M. rubra, *Sm.*
var. subspicata, *Rev. A. Ley.*
355. M. gentilis, *Linn.*
b. Wirtgeniana.
356. M. arvensis, *Linn.* *Field Mint.*
c. agrestis.
f. parietarifolia.

THYMUS.

357. T. Serpyllum, *Fries.* *Wild Thyme.*
358. T. Chamædrys, *Fries.*

ORIGANUM.

359. O. vulgare, *L.* *Wild Marjorum.*

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CALAMINTHA.

360. C. Clinopodium, *Spenn.* *Wild Basil Common Calamint.*
361. C. menthifolia, *Host.* *Thyme-leaved Basil.*

NEPETA.

362. N. Cataria, *L.* *Catmint.*
363. N. Glechoma, *Benth.* *Ground Ivy. All-hoof. Robin-run-in-the-hedge.*

MELISSA.

364. M. *officinalis, Linn.* *Balm.*

PRUNELLA.

365. P. vulgaris, *L.* *Self-heal. All-heal.*

MARRUBIUM.

366. M. vulgare, *L.* *Common Horehound.*

BALLOTA.

367. B. fœtida, *L.* *Stinking Horehound.*

STACHYS.

368. S. Betonica, *Benth.* *Wood Betony.*
369. S. palustris, *L.* *Marsh Woundwort.*
370. S. sylvatica, *L.* *Hedge Woundwort.*
371. S. arvensis, *L.* *Field or Corn Woundwort.*

GALEOPSIS.

372. G. Ladanum. *L.* *Red Hemp Nettle.*
373. G. Tetrahit, *L.* *Common Hemp Nettle.*

LEONURUS.

374. L. *Cardiaca, L.* *Motherwort. God's hand.*

LAMIUM.

375. L. amplexicaule, *L.* *Henbit.*
376. L. purpureum, *L.* *Henbit. Red Dead Nettle.*
377. L. album, *L.* *White Dead Nettle.*
378. L. Galeobdolon, *Crantz.* *Yellow Archangel. Weasel Snout.*

AJUGA.

379. A. reptans, *Linn.* *Bugle.*

TEUCRIUM.

380. T. Scorodonia, *L.* *Wood Sage.*

54.—Nat. order. Boraginaceæ.

LITHOSPERMUM.

381. L. officinale, *L.* *Common Gromwell.*
382. L. arvense, *L.* *Field Gromwell.*

MYOSOTIS.

383. M. cæspitosa, *Schultz.* *Tufted Water-Scorpion grass.*
384. M. palustris, *With.* *Forget-me-not.*
385. M. collina, *Reich.* *Dwarf Mouse-ear. Scorpion grass,—Rev. W. H. Purchas.*
386. M. versicolor, *Ehrh.* *Yellow and Blue Scorpion.*
387. M. arvensis, *Hoffm.* *Field Scorpion grass.*

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SYMPHYTUM.

388. S. officinale, *L.* *Comfrey.*

CYNOGLOSSUM.

389. C. officinale, *Linn.* *Common Hounds-tongue,—Rev. A. Ley.*

56.—Nat. order. Primulaceæ.

PRIMULA.

390. P. vulgaris, *L.* *Primrose.*

b. variabilis, *Goup.* Often mistaken for the true Oxlip, P. elatior.

391. P. officinalis, *Linn.* *Cowslip.*

LYSIMACHIA.

392. L. vulgaris, *L.* *Great Yellow Loose-stripe.*

393. L. Nummularia, *L.* *Creeping Loose-stripe. Moneywort.*

394. L. nemorum, *L.* *Wood Loose Stripe. Yellow Pimpernel.*

ANAGALLIS.

395. A. arvensis, *L.* *Scarlet Pimpernel. Poor Man's Weather-glass.*

396. A. cærulea, *Sm.* *Blue Pimpernel.*

57.—Nat. order. Plantaginaceæ.

397. P. major, *L.* *Greater Plantain. Way-bread.*

398. P. media, *L.* *Hoary Plantain. Lamb's-tongue.*

399. P. lanceolata, *L.* *Ribwort Plantain.*

400. P. Coronopus, *L.* *Buck's-horn Plantain.*

61.—Nat. order. Chenopodiaceæ.

CHENOPODIUM.

401. C. album, *L.* *Nettle-leaved Chenopodium.*

ATRIPLEX.

402. A. angustifolia, *Son.* *Narrow-leaved Orache.*

403. A. Smithii, *Syme.* *Rev. A. Ley.*

404. A. erecta, *Huds.* *Orache.*

62.—Nat. order. Polygonaceæ.

RUMEX.

405. R. conglomeratus, *Murr.* *Sharp-leaved Dock.*

406. R. nemorosus, *Schræd.*

a. viridis. *Green-veined Dock.*

407. R. obtusifolius, *Auct.* *Broad-leaved Dock.*

408. R. crispus, *Linn.* *Curled-leaved Dock.*

409. R. Acetosa, *L.* *Common Sorrel.*

410. R. Acetosella, *L.* *Sheep's Sorrel.*

POLYGONUM.

411. P. *Fagopyrum*, *L.* *Buck-wheat.*

412. P. Convolvulus, *L.* *Climbing Bistort.*

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413. P. aviculare, *Linn.* *Knot-grass.*
414. P. Hydropiper, *Linn.* *Biting Persicaria.*
415. P. Persicaria, *Linn.* *Spotted Persicaria.*
416. P. lapathifolium, *L.* *Pale-flowered Persicaria.*
417. P. maculatum, *Dyer.*
418. P. mite, *Schrank.*
419. P. amphibium. *Amphibious Persicaria.*
b. terrestre.

64.—Nat. order. **Thymeleaceæ.**

DAPHNE.

420. D. Laureola, *L.* *Spurge Laurel.*

66.—Nat. order. **Euphorbiaceæ.**

EUPHORBIA.

421. E. Helioscopia, *L.* *Sun Spurge. Wart Spurge.*
422. E. amygdaloides, *L.* *Wood Spurge.*
423. E. Peplus, *L.* *Petty Spurge.*
424. E. exigua, *L.* *Dwarf Spurge.*

MERCURIALIS.

425. M. perennis, *L.* *Perennial or Dog's Mercury.*

71.—Nat. order. **Urticaceæ.**

URTICA.

426. U. dioica, *L.* *Great Nettle.*

PARIETARIA.

427. P. diffusa, *Koch.* *Wall Pellitory.*

HUMULUS.

428. H. Lupulus, *L.* *Hop.*

ULMUS.

429. U. suberosa, *Ehrh.* *Elm.*
430. U. montana, *Sm.* *Wych Elm.*
Var. nitida, *Rev. A. Ley.*

71.—Nat. order. **Amentiferæ.**

QUERCUS.

431. Q. pedunculata, *Ehr.* *Oak.*
432. Q. sessiliflora, *Sm.* *Sessile-fruited Oak.*

FAGUS.

433. F. sylvatica, *L.* *Beech.*

CORYLUS.

434. C. Avellana, *L.* *Hazel.*

ALNUS.

435. A. glutinosa, *L.* *Common Alder.*

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BETULA.

436. B. alba, *L.* *Common Birch.*
a. verucosa, *Rev. A. Ley.*
b. glutinosa.

POPULUS.

437. P. tremula, *L.* *Aspen.*
438. P. *nigra*, *L.* *Black Poplar.*

SALIX.

439. S. fragilis, *Linn.* *Crack Willow.*
440. S. viridis, *Fries.*
b. Russelliana.
441. S. alba, *Linn.* *Common White Willow.*
c. vitellina.
442. S. triandra, *Linn.* *Long-leaved Willow.*
b. Hoffmanniana, *Rev. A. Ley.*
442A. S. purpurea, *L.* *(Rev. A. Ley.)*
442B. S. rubra, *Huds.*
c. helix. *Rose Willow,—Rev. A. Ley.*
443. S. viminalis, *Linn.* *Common Osier.*
b. intricata, *Rev. A. Ley.*
444. S. cinerea, *L.* *Grey Willow.*
b. aquatica.
445. S. caprea, *Linn.* *Round-leaved Willow.*
446. S. Smithiana, *Willd.* *Silky-leaved Osier.*

73.—Nat. order. Coniferæ.

TAXUS.

447. T. baccata, *L.* *Yew-tree.*

MONOCOTYLEDONES.

74.—Nat. order. Typhaceæ.

SPARGANIUM.

448. S. ramosum, *Huds.* *Branched Bur Reed.*

75.—Nat. order. Araceæ.

ARUM.

449. A. maculatum, *L.* *Cuckoo Pint. Wake Robin. Lords and Ladies.*

76.—Nat. order. Lemnaceæ.

LEMNA.

450. L. minor, *L.* *Lesser Duck-weed.*

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77.—Nat. order. Naiadaceæ.

POTAMOGETON.

451. P. salicifolius, *Wolfg.* P. *Lonchites, Tuck.* *Rev. W. H. Purchas.*
452. P. lucens, *Linn.* *Shining Pondweed.*
453. P. acuminatus lucens, *Linn.*
454. P. perfoliatus, *L.* *Perfoliate Pondweed.*
455. P. crispus, *L.* *Curled-leaved Pondweed.*
456. P. pusillus, *L.* *Small Pondweed.*
457. P. pectinatus, *L.* *Fennel-leaved Pondweed.*

78.—Nat. order. Alismaceæ.

TRIGLOCHIN.

458. T. palustre, *L.* *Marsh Arrow Grass.*

BUTOMUS.

459. B. umbellatus, *L.* *Flowering Rush.*

ALISMA.

460. A. Plantago, *L.* *Greater Water Plantain.*

79.—Nat. order. Hydrocharidaceæ.

ELODIA.

461. E. *canadensis, Mich.* *American Water Weed.*

80.—Nat. order. Orchidaceæ.

ORCHIS.

462. O. Morio, *L.* *Green-winged Meadow Orchis.*
463. O. mascula, *L.* *Early Purple Orchis.* (Said to be the long purples of Shakespeare.)
464. O. maculata, *L.* *Spotted-leaved Orchis.*

HABENARIA.

465. H. chlorantha, *Bab.* *Great Butterfly Orchis.*

OPHRYS.

466. O. apifera, *Huds.* *Bee Orchis.*
467. O. muscifera, *Huds.* *Fly Orchis.*

LISTERA.

468. L. ovata, *Brown.* *Common Tway-blade.*

NEOTTIA.

469. N. Nidus-avis, *Rich.* *Birds'-nest Orchis.*

EPIPACTIS.

470. E. latifolia, *Auct.* *Broad-leaved Helleborine.*
471. E. ovalis, *Bab.* *Oval-leaved Helleborine,—Prof. Babington.*
472. E. violacea, *D. Dug.* *Purple-leaved Helleborine.*
media of *Fries.* *Rev. A. Ley.*

CEPHALANTHERA.

473. C. grandiflora, *Bab.* *Cream-coloured Helleborine.*

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474. C. ensifolia, *Rich.* *Narrow-leaved white Helleborine,—Mr. Southall.*

81.—Nat. order. Iridaceæ.

IRIS.

475. I. Pseudacorus, *Linn.* *Flag water Iris.*

82.—Nat. order. Amaryllidaceæ.

GALANTHUS.

476. G. nivalis, *Linn.* *Snowdrop. Fair Maids of February.*

83.—Nat. order. Dioscoreaceæ.

TAMUS.

477. T. communis, *Linn.* *Common Lady's Seal. Black Bryony.*

83*.—Nat. order. Trilliaceæ.

PARIS.

478. P. quadrifolia, *Linn.* *Herb Paris. One Berry. Herb truelove.*

84.—Nat. order. Liliaceæ.

CONVALLARIA.

479. C. majalis, *L.* *Lily of the Valley,—Rev. A. Ley.*

"Fair flower! than whom the vernal gale
None fairer wakes on bank or spray;
Our England's Lily of the May,
Our Lily of the Vale."

SCILLA.

480. S. nutans, *Sm.* *Bluebell. Wood Hyacinth.*

ALLIUM.

481. A. vineale, *L.* *Crow Garlic*

482. A. Schœnoprasum, *L.* *Chives.*

483. A. ursinum, *L.* *Ramsons.*

COLCHICUM.

484. C. autumnale, *L.* *Meadow Saffron.*

86.—Nat. order. Juncaceæ.

LUZULA.

485. L. Forsteri, *D.C.* *Narrow-leaved hairy Wood Rush.*

486. L. pilosa, *Willd.* *Broad-leaved hairy Wood Rush.*

b. Borreri. *Borrer's Wood Rush.*

487. L. sylvatica, *Beck.* *Great Wood Rush.*

488. L. campestris, *D.C.* *Field Wood Rush.*

489. L. multiflora, *Koch.* *Many-flowered Wood Rush.*

b. congesta.

JUNCUS.

490. J. conglomeratus, *L.* *Common Rush.*

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491. J. effusus, *L.* *Soft Rush.*
492. J. glaucus, *Sibth.* *Hard Rush.*
493. J. acutiflorus, *Ehrh.* *Sharp-flowered jointed Rush.*
494. J. lamprocarpus. *Ehrh.* *Shining-fruited jointed Rush.*
495. J. bufonius, *L.* *Toad Rush.*

87.—Nat. order. Cyperaceæ.

Blysmus.

496. B. compressus, *Panz.* *Compressed Club Rush,—Mr. Willmott.*

Scirpus.

497. S. palustris, *L.* *Creeping Spike Rush.*
498. S. setaceus, *L.* *Bristle-stalked Club-Rush.*
499. S. sylvaticus, *L.* *Wood Club Rush.*

Eriophorum.

500. E. latifolium, *Hoppe.* *Downy-stalked Cotton Grass.*

Carex.

501. C. vulpina, *L.* *Great compound prickly Carex.*
502. C. muricata, *L.* *Prickly Carex.*
503. C. divulsa, *Good.* *Gray Carex.*
504. C. stellulata, *Good.* *Little prickly Carex.*
505. C. remota, *L.* *Remote Carex.*
506. C. ovalis, *Good.* *Oval-spiked Carex.*
507. C. acuta, *L.* *Slender-spiked Carex.*
508. C. vulgaris, *Fries.* *Tufted Bog Carex.*
509. C. glauca, *Scop.* *Glaucous Heath Carex.*

Locally called Carnation Grass, and when growing in damp pastures where cattle and sheep are grazing is said to cause them, by some mysterious agency, to be infected with the "Fluke," so fatal to sheep in particular.

510. C. digitata, *L.* *Fingered Carex.*
511. C. humilis, *Leysse.* *Dwarf Silvery Carex,—Mr. Willmott.*
512. C. montana, *L.* *Mountain Carex, Rev. W. H. Purchas.*
513. C. pilulifera, *L.* *Round-headed Carex.*
514. C. præcox, *Jacq.* *Vernal Carex.*
515. C. pallescens, *L.* *Pall Carex.*
516. C. panicea, *L.* *Pink-leaved Carex.*
517. C. pendula, *Huds.* *Great Pendulous Carex.*
517A. C. strigosa, *Huds.* *(Rev. A. Ley.)*
518. C. sylvatica, *Huds.* *Pendulous Wood Carex.*
519. C. fulva, *Good.* *Tawny Carex.*

b. speirostachya.

520. C. flava, *L.* *Yellow Carex.*
521. C. hirta, *L.* *Hairy Carex.*
522. C. riparia, *Curtis.* *Common Carex.*

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88.—Nat. order. Gramina.

ANTHOXANTHUM.

523. A. odoratum, *L.* *Sweet Vernal Grass.*

PHALARIS.

524. P. *canariensis*, *L.* *Canary Grass. Garden Escape.*

DIGRAPHIS.

525. D. aurundinacea, *Trin.* *Reed Canary Grass.*

ALOPECURUS.

526. A. agrestis, *L.* *Slender Fox-tail Grass.*
527. A. geniculatus, *L.* *Floating Fox-tail Grass.*
528. A. pratensis, *Linn.* *Meadow Fox-tail Grass.*

PHLEUM.

529. P. pratense, *L.* *Meadow Timothy Grass.*

AGROSTIS.

530. A. canina, *L.* *Brown Bent Grass.*
531. A. alba, *L.* *Marsh Bent Grass.*
532. A. vulgaris, *With.* *Common Bent Grass.*

PHRAGMITES.

533. P. communis, *Trin.* *Common Reed.*

MILIUM.

534. M. effusum, *L.* *Millet Grass.*

AIRA.

535. A. cæspitosa, *L.* *Turfy Hair Grass.*
536. A. caryophyllea, *L.* *Wavy Hair Grass.*
537. A. præcox, *L.* *Early Hair Grass.*
538. A. flexuosa, *L.* *Wavy Hair Grass.*

AVENA.

539. A. flavescens, *L.* *Yellow Oat Grass.*
540. A. pubescens, *L.* *Downy Oat Grass.*
541. A. fatua, *L.* *Wild Oat.*
542. A. elatior, *L.* *Oat-like Grass.*
b. nodosum. *Knotted Couch-Grass.*

HOLCUS.

543. H. lanatus, *L.* *Meadow Soft Grass.*
544. H. mollis, *L.* *Creeping Soft Grass.*

TRIODIA.

545. T. decumbens, *Beauv.* *Decumbent Heath Grass.*

KOELERIA.

546. K. cristata, *Pers.* *Crested Hair Grass.*

MOLINIA.

547. M. cærulea, *Moench.* *Heath Purple Melic Grass.*
var. major.

MELICA.

548. M. nutans, *L.* *Mountain Melic Grass,—Mr. Willmott.*
549. M. uniflora, *Retz.* *Wood Melic Grass.*

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GLYCERIA.

550. G. fluitans, *Brown.* *Floating Sweet Grass.*

551. G. plicata, *Fries.* *Folded-leaved Sweet Grass.*

SCLEROCHLOA.

552. S. distans, *Bab.* *Reflexed Hard Grass.* *Great Doward, Rev. A. Ley. Lesser Doward, Rev. W. H. Purchas.*

553. S. rigida, *Link.* *Hard Grass.*

POA.

554. P. annua, *L.* *Annual Meadow Grass.*

555. P. nemoralis, *L.* *Wood Meadow Grass.*

556. P. compressa, *L.* *Flat-stalked Meadow Grass.*

557. P. pratensis, *L.* *Smooth-stalked Meadow Grass.*

558. P. trivialis, *L.* *Roughish Meadow Grass.*

BRIZA.

559. B. media, *L.* *Common Quaking Grass.*

CYNOSURUS.

560. C. cristatus, *L.* *Dog's-tail Grass.*

DACTYLUS.

561. D. glomerata, *L.* *Cock's-foot Grass.*

FESTUCA.

562. F. ovina, *L.* *Slender Fescue Grass.*
c. glauca, *Rev. W. H. Purchas.*

563. F. rubra, *L.* *Creeping Fescue Grass.*
a. duriuscula.
b. arenaria.

564. F. elatior, *L.* *Tall Fescue Grass.*

565. F. pratensis, *Huds.* *Meadow Fescue Grass.*
b. loliacea, *Rev. A. Ley.*

BROMUS.

566. B. giganteus, *L.* *Tall Brome Grass.*

567. B. asper, *Murr.* *Hairy Wood Brome Grass.*
a. serotinus.
b. Benekenii.

568. B. erectus, *Huds.* *Upright Brome Grass,—Rev. A. Ley.*

569. B. sterilis, *L.* *Barren Brome Grass.*

570. B. commutatus, *Schrad.* *Meadow Brome Grass.*

571. B. mollis, *L.* *Soft Brome Grass.*

BRACHYPODIUM.

572. B. sylvaticum, *R. & S.* *Slender False Brome Grass.*

TRITICUM.

573. T. caninum, *Huds.* *Fibrous-rooted Brome Grass.*

574. T. repens, *L.* *Creeping Wheat Grass.*

LOLIUM.

575. L. perenne, *L.* *Common Ray or Rye Grass.*

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576. L. *italicum, Braun.* *Italian Rye Grass.*

HORDEUM.

577. H. sylvaticum, *Huds.* *Wood Barley.*
578. H. murinum, *L.* *Wall Barley.*

CRYPTOGAMEÆ.

89.—Nat. order. Filices.

PTERIS.

579. P. aquilina, *L.* *Brakes. Bracken.*

LOMARIA.

580. L. spicant, *Desv.* *Hard Fern.*

ASPLENIUM.

581. A. Ruta-muraria, *L.* *Wall Rue. Rue-leaved Spleen-wort.*
582. A. Trichomanes, *Linn.* *Common Spleen-wort.*
582A. A. Adiantum-nigrum, *L.* *Black Spleen-wort.*

ATHYRIUM.

583. A. Filix-fœmina, *Bernh.* *Drooping Lady's Fern.*

CETERACH.

584. C. officinarum, *Willd.* *Scale Fern.*

SCOLOPENDRIUM.

585. S. vulgare, *Sm.* *Hart's Tongue.*

ASPIDIUM.

586. A. aculeatum, *Sw.* *Prickly Shield Fern.*
587. A. angulare, *Willd.* *Soft Prickly Fern.*

NEPHRODIUM.

588. N. Filix-mas, *Rich.* *Male Fern.*
589. N. spinulosum, *Desv.* *Prickly-toothed Fern.*
590. N. dilatatum, *Desv.* *Broad Prickly-toothed Fern.*

POLYPODIUM.

591. P. vulgare, *L.* *Common Polypody.*
592. P. Robertianum, *Hoffm.* *Limestone Polypody.*

OPHIOGLOSSUM.

593. O. vulgatum, *L.* *Adder's Tongue.*

BOTRYCHIUM.

594. B. Lunaria, *Sw.* *Moon Wort,—Mr. Brown.*

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WOOLHOPE TRANSACTIONS, 1881,

PAGE 84A.

ADDENDA.

APRIL, 1893.

WE take the present opportunity of placing on record several Flowering Plants and Ferns which have been detected upon the Doward Hills since 1881. This additional list has been supplied by the Rev. Augustin Ley.

36A. Barbarea intermedia, *Boreau.*
66A. Stellaria umbrosa, *Opitz.*
77A. Hypericum calycinum, *L.* Naturalised.
152A. Fragaria elatior, *Ehrh.* Naturalised.
159A. Rubus Massii, *Focke.* R. macrophyllus, *W.* var. umbrosus, of L.C., Ed. vii.
160A. Rubus Drejeri. *G. Jensen.* R. Purchasii, Blox., Herefordshire Flora.
163A. Rubus thyrsiflorus, *W. and N.*, teste Prof. Babington. R. Lœhri, *Wirtg.*, teste Dr. Focke.
182A. Pyrus latifolia, *Syme.*
189A. Epilobium Lamyi, *Wirtg.*
274A. Inula Helenium, *L.* Naturalised.
293A. Crepis biennis, *L.* Naturalised.
301A. Hieracium tridentatum, *Fr.*
384A. Myosotis sylvatica, *Hoffm.* Naturalised.
431A. Quercus intermedia, *Don.* Confirmed through the London Botanical Exchange Club.
442B. Salix hippophaæfolia, *Thuill.*
475A. Iris fœtidissima, *L.* Naturalised.
500A. Eriophorum angustifolium, *Roth.*
521 Var. Carex hirta, *L.*, var. hirtæformis.
563A. Festuca sylvatica, *Vill.*
585A. Cystopteris fragilis, *Bernh.*
587A. Nephrodium Oreopteris, *Desv.* *Sweet Mountain Fern.*

ERRATUM.

On page 71. For 270. G. norvegicum, *Gunn*, read 270. G. margaritaceum, *Linn.*

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92.—Nat. order. Equisetaceæ.

EQUISETUM.

595. E. arvense, *L.* *Field Horsetail.*
596. E. maximus, *Lam.* *Great Horsetail.*
597. E. palustre, *L.* *Marsh Horsetail.*

93.—Nat. order. Characeæ.

CHARA.

598. C. fœtida, *Braun.* *Common Chara.*
599. C. fragilis, *Desv.* *Brittle Chara.*

*** In the foregoing "Florula of the Dowards," the amendments and corrections have been made up to the date of printing. We have now to add the following remarks:—

1.—To page 57, line 2, et seq., add—"*Cephalanthera grandiflora* has been recently found just within the western boundary of the Ledbury District."

2.—On line 22 of same page (57), for "44" read "42"; which alteration is due to the recent discovery of *Ribes nigrum* by the Rev. A. Ley, and of *Asplenium Adiantum nigrum* by Mr. Watkins himself only a month ago.

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Woolhope Naturalists' Field Club.

THE FUNGUS FORAY,

October, 1881.

During the week the following Papers were read and discussed:—

"The Progress of Mycology," by Dr. Bull.

"The Carices of Herefordshire," by Rev. Augustin Ley, M.A., President.

"Mimicry in Fungi," by Dr. M. C. Cooke, LL.D., A.L.S., &c.

"The Fungi in the Dolomites," by Mr. T. Howse, F.L.S., &c.

"Protococcus," by Rev. J. E. Vize, M.A., F.L.S., &c.

"The Fungi which attack the Wheat," by Rev. J. E. Vize, M.A., F.L.S., &c.

"Monstrosities in Fungi," by Mr. Wm. Phillips, F.L.S.

"Two Tomato Diseases," by Mr. C. B. Plowright.

"The connection of Wheat Mildew" (*Puccinia Graminis*, Pers.), with the Barberry Æcidium (*Æ. Berberidis*, Gmel.), by Mr. C. B. Plowright.

"The Germination of the Uredines," by Mr. C. B. Plowright.

THE FUNGUS FORAY.

In accordance with time-honoured custom, the last week in October witnessed the gathering together of a large number of the infatuated fungus-hunters of England to the venerable cathedral city of Hereford, for the purpose of indulging in a week's study of fungi in the woods and fields of that neighbourhood. For many years it has been the ill-fortune of those enthusiasts to pursue their investigations more or less beneath a cloudy sky, and often amidst the pouring rain. This year, however, the weather was more propitious. Indeed it was all that could have been desired, except for the bleak cold wind which shrivelled up the fungi, and almost crumpled up some of the hunters, who were hardly prepared for the bleak sequel which many of the evenings furnished to a bright and sunny day. A fortnight before the meeting commenced we had seen some of the localities, and noted with pleasure the prospect of a rare harvest, for the fungi were appearing in great numbers, and the Hereford forays of 1881 were anticipated as probably the most productive for many years. Then came cold nights and east winds, before which the fungi vanished, and with them the dreams which had been fo fondly cherished. To say the least, the result was a disappointment, because so much had been expected. Blessed are they who never build their hopes on fungi, for they are the most uncertain and erratic of created things.

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On Monday, October 3rd, the company began to collect as usual. The "guiding spirit" stood smiling on the platform of the railway station to welcome the "coming men." But they came slowly. and not very cheerfully, for they had forebodings of what was in store for them. Yet, ultimately, they did come, and entered with spirit upon the occupation of the week. Amongst the number were Messrs. Bicknell, Bucknall, Cooke, Howse, Mott, Phillips, Plowright, and Wharton, and the Revs. Du Port, Eyre, and Vize. A reception at Dr. Bull's, and a discussion of the plans and arrangements for the week, closed the day.

Tuesday, October 4th, an excursion to Moccas Park, the residence of Sir George Cornewall, inaugurated the practical work. The day was fine, but cold, and spirits ran high. The large and beautiful domain was scoured in all directions, but the fungi were few and far between. Baskets remained empty, or with a few well-known specimens sprinkled over the bottom. A splendid ring of *Agaricus arvensis* was appropriated with avidity, and served to fill baskets which otherwise would have remained unfurnished. Even *Polyporus dryadeus* was welcome, for it helped to fill up. There was no alternative but to take what could be got, and the homeward ride was enlivened by an animated discussion over a few common species, the determination of which was challenged, rather for the sake of stimulating the interest of the party than as the result of actual scepticism. This process being repeated in after days led to the application of certain well-known lines, thus modified—

"'Tis the voice of the canon, I heard him complain,
'That can't be the species, compare it again.'"

Of a certainty the unanimous thanks of the company were due to those enterpising individuals who carried several of Fries' octavo volumes about with them in order to improve the occasion by voluntary "readings" in Latin. The true meaning of such words as "luridus," "gilvus," and "candicans," had never been submitted to such keen criticism before, and the conclusions appeared to be completely satisfactory, for they were carried *nem. con.*

In the evening a second reception was held at Dr. Bull's, when Mr. C. B. Plowright read his paper on "The Relationship of Æcidium berberidis to Puccinia graminis," in which he describes the numerous experiments conducted by him during the past year, the results of which did not by any means confirm the theory that the *Æcidium* is the cause of the wheat mildew. In thirteen experiments seventy-eight wheat plants were infected by spores of *Æcidium berberidis*, and ninety-eight wheat plants kept as check plants against them. Of the infected plants 76 per cent. developed Uredo on an average in 24·4 days, while in the same period 70 per cent. of the uninfected plants became spontaneously attacked by the Uredo. Such results could not be considered as confirming the relationship of *Æcidium berberidis* to *Puccinia graminis*. Some discussion followed the reading of this paper, during which Dr. Cooke repudiated the assertion which had been made, that he was an advocate of the theory which, in fact, he had always asserted was "not proven." Mr. Bicknell also related his experience of having seen *Æcidium* in Switzerland such a common hedge plant that if the theory were true,

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the wheat plant would have been extirpated in the "struggle for existence." The Rev. J. E. Vize also read his paper on "Protococcus."

On Wednesday morning, October 5th, the excursion was made to Haywood Forest, one of the earliest spots, if not the very first, on which the Woolhope Club commenced the study of fungi. Many species which a fortnight before might have been collected by the basketful could not be seen at all, and all were comparatively scarce. At the evening reception, Mr. Howse read his paper on "The Fungi of the Dolomites," and, subsequently, Mr. Phillips essayed a classification of the abnormal conditions of fungi called "monstrosities," and made useful suggestions as to the observation and record of such conditions as likely to throw some light on the structure and development of the higher fungi. Mr. Plowright also read his communication on "The Germination of Uredo Spores."

Thursday, October 6th, being the Club day, the excursion was a short one, to Stoke Edith Park, but the dearth of fungi was as conspicuous, if not more so, than at Moccas. It was considered noteworthy that some half-dozen specimens of *Cynophallus caninus* were found, and about twice as many of *Lycoperdon Hoylei, B. & Br.*, which appears to be the same as *Lycoperdon echinatum* of Persoon. It was intended in the first instance to have made the *Russulæ* the special subject for investigation during the week, but the great dearth of these soon led to the abandonment of such a hope.

After the dinner, which, as usual, was held at the Green Dragon, the Rev. J. D. La Touche complained that such an enormous number of new species of fungi were being found and described, that the ultimate prospect was fearful to contemplate. Dr. Bull read also a most valuable communication on "The Progress of Mycology," chiefly with reference to the minute forms and their connection with disease. Subsequently the members and visitors adjourned to a reception at Mr. Cam's, when the remainder of the papers which had been promised were read. The President (the Rev. Augustin Ley) illustrated an elaborate and critical enumeration of "The Carices of Herefordshire" with a large collection of dried specimens, which were examined with great interest. Mr. W. Phillips read a communication on a *Peziza* of doubtful affinity, from Mr. Renny.

The last day, Friday, October 7th, was devoted to an excursion to the neighbourhood of Ludlow. Wycliff Wood and Mary Knoll furnished a larger variety of species than had been found anywhere during the week, and it was universally admitted that this was the most interesting and successful of the week's excursions, even exclusive of the practical *finale* at Mr. Fortey's, which is always the welcome conclusion to the Club's visits to Ludlow.

We have not mentioned the new and rare species which each of these excursions furnished, because, being so few, they might find a more fitting place at the end. The show in the Free Library was much below the average, and the finest exhibit was a portion only of Mr. Worthington Smith's gigantic specimen of *Sparassis crispa*, four feet in diameter when entire, which had undergone its journey from Epping uninjured.

Perhaps the most noteworthy of species new to Britain was *Lactarius flexuosus*, of which three or four specimens were found. An Agaric, with the margin of the

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gills tinted with rose colour, of which only one specimen was found, appeared to be the *Agaricus (Tricholoma) rubens*, Quelet. *Agaricus (Clitocybe) tumulosus*, Kalch., was again found, as it had been in a former year, but not recorded; and *Agaricus (Clitocybe) catinus*.

Of the rarer species the number was also small, including *Agaricus (Collybia) rancidus*, Fr.; a splendid *Cortinarius*, which did not appear to be specifically distinct from *Cortinarius fulgens*, Fr.; the delicate white *Russula lactea*, Fr.; *Agaricus (Hypholoma) udus*, P., and *Agaricus (Hypholoma) storea*, Fr., both new to Herefordshire. *Agaricus (Lepiota) ermineus*, Fr. was brought from Malvern; and *Agaricus (Lepiota) gracilentus*, Fr., was not uncommon near Haywood Forest. The yellow variety of *Russula fragilis* (Fries, *Syst. Myc.*) having been recently constituted a distinct species under the name of *Russula citrina*, Gillet, appeared under its new name, but seems to be very common everywhere in England.

Thus ends our record of the Woolhope meeting of 1881. There was a dearth of nothing but fungi. Hearty welcome to strangers, cheerful companionship, free and profitable interchange of opinions, zeal, energy, and a hopeful anticipation of a better future were all as strong as ever. New faces appeared, old faces were absent, and yet the last line of the programme was reached—

"Saturday, October 8th—Departure of Visitors."

M.C.C.—From the *Gardeners' Chronicle*, October 22nd, 1881.

THE CARICES OF HEREFORDSHIRE.

By Rev. Augustin Ley, M.A.

I do not think that the *Carices* need any introduction of mine in a meeting of naturalists; nor will I stay at present to say more than that the accompanying collection, though being very far from perfect, yet contains, I believe, representatives of all the *Carices* up to this time recorded for the County of Hereford, namely 34 species, out of a total of 65 recorded in the *London Catalogue* for the whole of the British Isles.

1. **Carex publicaris**, *L.* "*Flea Sedge.*" Eight Districts. This Sedge is thinly but widely spread in Herefordshire. It is reported from just one more than half of the 14 botanical divisions of the county; and its absence from the remainder is perhaps more apparent than real, since the districts in which its presence has not been noted are those which have been least carefully examined: besides, being our smallest species it is apt to be overlooked, unless when the fruit is ripe, when its peculiar resemblance to a nest of fleas makes it more conspicuous. Its presence is, I believe, a sign of unbroken—certainly of poor and wet—soil; and the comparative rareness of these conditions (happily) may be the reason of its comparative scarcity in Herefordshire.

2. **Carex disticha**, *Huds.* Four Districts. This sedge is remarkably

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scarce in Herefordshire. It is local; and I have never seen it abundant in any of its localities. It loves rich wet alluvial soil, where it prefers the sides of ditches or drains. Its Herefordshire localities are most of them in the Wye meadows in its lower course, where four stations are known for it in the Ross District. Otherwise, it is reported in one locality in each of three of the central Districts of the county (7, 8, and 9).

3. **Carex paniculata,** *L.* Five Districts. This is a plant which, when well developed, nobody can pass over without at least being aware of its presence. It is widely distributed in the county, and is locally abundant, attaining huge dimensions in favourable localities (as for example, at the Fishpool at St. Weonards, and in a boggy thicket near Eaton Bishop). It seems to enjoy a more hardy and tougher vitality than most Sedges; for it clings to stream sides for years after the boggy thickets in which it delights have been drained or cultivated; but wherever it is thus found, its presence may be taken for a proof of the former existence of bog or marsh. It is one of the finest of the genus; but its grandeur is incapable of being represented in herbarium specimens.

4. **Carex vulpina,** *L.* It is reported from 12 out of the 14 Districts; and no doubt occurs in them all. It is one of our most common Sedges, occupying the position in wet places which its congeners *muricata* and *divulsa* do in dry. It is liable to a curious malformation of the fruit (the effect of some insect?) which is then produced into a long curved horn. The plant bearing this malformation occurs in abundance along the edge of the Hereford Canal.

5. **Carex muricata,** *L.* Eight Districts. This Sedge is, in Herefordshire, the constant companion of *divulsa*. Where one is found, the other is mostly not far to seek. They are both of them among the dry-loving *Carices;* and they are the only two which find their natural home in dry hedgebanks, among Primroses, Stitchwort, and Wood-violets. Here their slender wiry stems and fruit are very pretty, in early summer, and add an element to hedgebank beauty which would, without them, be wholly absent.

6. **Carex divulsa,** *Good.* Six Districts. The distribution and habits of this are exactly those of the last; and the two, as far as I have noticed, seem equally and commonly distributed in Herefordshire. Its being reported from *six*, while *muricata* is reported from *eight*, Districts, must I think be a pure accident; though it agrees, so far as it goes, with the fact that its general distribution in Great Britain is not much more than one *half* (46 as compared with 72 counties) that of *muricata*. The variety of *muricata*, *pseudo-divulsa*, I have never picked and do not know. I should imagine that it must be a Sedge with the aspect of *muricata*, and the technical characters of *divulsa*. It should be looked for in Herefordshire: and I should be grateful to any botanist who will find it and send me specimens.

7. **Carex stellulata,** *Good.* Nine Districts. The habits and distribution of this are just those of *Carex pulicaris*; and like it, it appears to be a concomitant of poor wet and untouched pasture land. I believe it however (in spite of the greater number of Districts reported in its favour), to be really the rarer of the two in Herefordshire. It seems to be nowhere individually abundant in its

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habitats; and it never is to be found with us so aggregated as to form quite a feature in the turf, as it does in higher and moorland districts.

8. **Carex remota**, *L.* Reported from 13 Districts; the one (Aymestry District) omitted doubtless from insufficient observation. This pretty Sedge is abundant everywhere in Herefordshire, and is not at all nice in choosing its places of growth, demanding only the neighbourhood of a ditch, or some comparatively stagnant water. The edges of pools which are in the process of being silted up with mud seem the position in which it attains its greatest perfection. Here it is conspicuous among its companions for its narrow light green foliage, with a graceful curve, in which the fruiting spikes by reason of their long leafy bracts, also join.

9. **Carex axillaris**, *Good.* Three Districts. This plant is the exact contrary of the last, to which nevertheless it is closely allied, in being rare and exceedingly local. Its first discovery in Herefordshire was due to Rev. J. F. Crouch, of whose gathering I have a specimen from Mosely Common, dated 1852. This remained its only station on record till 1879, when I found a single tuft on the brink of the Ledbury canal, near Hereford. In the following year I found it again in woods at the base of the Herefordshire Beacon: and in the same year I was informed by Mr. Towndrow (who kindly communicated specimens to the County collection) that it was "abundant in woods all round the base of the Malvern hills." This is a singular instance of what seems to us the caprice of a shy and local plant, and shows our ignorance of a great part of the conditions which go to determine plant distribution.

Mr. Towndrow gave me at the same time a remarkable variety of this plant, which has all the spikelets aggregated into a single head. This has not as yet been found on the Herefordshire side of the hills.

10. **Carex ovalis**, *Good.* Ten Districts. Probably existing in all the Districts. Common enough, and pretty evenly distributed, this plant can yet not be termed abundant in Herefordshire. It is common (1) in the rich alluvial meadows adjoining the Wye; (2) in poor wet pastures in the hill districts: but much of the intermediate country may be searched for it in vain. Mr. Towndrow informs me that the remarkable dwarf variety with foliaceous bracts (*b. bracteata*, L.C.,) is abundant on the Commons round Malvern. This should be looked for on some of the similar land which falls within Herefordshire, *e.g.*, Bringsty Common, near Whitbourne. The typical plant however will occasionally be found with lengthened bracts; sometimes bracteate and bractless scapes thrown up from one root, showing the worthlessness of the length of the bract as a varietal character.

11. **Carex acuta**, *L.* Four Districts. This fine Sedge is locally abundant; but apparently it is confined to the lower lands. It reaches its greatest abundance about the lower course of the Wye, in the Ross District, where it occurs abundantly, fringing both the river bank itself and that of ditches and pools in the river meadows. It is very abundant also further down the river, in the districts between Monmouth and Chepstow.

12. **Carex vulgaris**, *Fries.* Eleven Districts; most probably to be found in all. This is a far less local plant than the last. It does not seem to be confined to any particular soil or altitude: still it is only thinly scattered in Hereford-

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shire, and nowhere with us reaches that abundance which it does upon moorlands.

13. **Carex glauca**, *Scop.* Fourteen Districts. This is perhaps the most universally distributed of all the family, both over Britain, and (certainly) in Herefordshire. Being the most common it is also the least liked—for it forms the ill-famed "carnation grass," upon which our farmers vent some of their feelings in these years of depression and loss. I need not point out to naturalists the mistake underlying this prejudice; but will only go on to say that, being the most common, it is also one of the prettiest of all. The pinky tinge of its hanging spikelets, crowned when in flower with their three white stigmas, blends with the glaucous blue of its short foliage to give it all the grace which marks, unseen, our most common plants. It can hardly fail to become a favourite of any lover of nature.

14. **Carex digitata**, *L.* One District. Our three greatest Sedge-rarities, *digitata*, *montana*, and *humilis*, all come together in the catalogue just as they all grow close together upon the Doward hills. This well-named plant, the *Fingered Sedge*, is quite unlike any other of the Herefordshire species, or indeed of the British, with the exception of the recently discovered *ornithopoda*, Willd. It is very abundant in the dry limestone woods of the Dowards; and it occurs also (still upon limestone) on the Coppet Hill, and in small quantities (on sandstone, but with other limestone plants,) at Caplar. All these stations are in the Ross District.

15. **Carex humilis**, *Leyss.* One District. This rare plant was discovered upon one of the bare points of limestone rock on the Great Doward, I believe by Mr. A. T. Wilmott, some years ago. Since that time, one other similar point of rock has been added; but to these two points, *i.e.*, three or four square yards, it is, as far as yet known, confined. It is thus certainly the rarest we possess in our Flora, and affords a curious instance how a plant may battle on successfully in a position where circumstances give it some slight vantage ground in the struggle for existence. Had it not entrenched itself on these two rock points, where it is raised up several yards higher than the surrounding ground, it would, no doubt, long ago have succumbed to the overgrowth of the brushwood, under the shade of which it appears not to be able to exist. May it long continue to hold its castles, unconquered either by nature or man!

16. **Carex montana**, *L.* One District. This also is confined to a single locality; but, unlike the last, it is fairly abundant in the dry limestone woods of the Greater Doward. Its remarkable and unmistakable fruit is in some seasons rather rare, and the plant is not very easily recognizable by its leaves. But the large, tough, creeping root-stock, is a point by which it is always easily known. Its discoverer in Herefordshire was, I believe, the Rev. W. H. Purchas. Of the three plants just enumerated, *C. digitata* is abundant on the west Gloucester side of the river gorge at the Dowards; the other two, *humilis* and *montana* have not yet, I believe, been discovered there.

17. **Carex pilulifera**, *L.* Six Districts. These Districts are a very inadequate number to represent the distribution in Herefordshire of this common Sedge. It is most probably often passed over as a variety of *C. præcox*, from which

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however its decumbent, wiry fruit-stalk separates it at a glance; to say nothing of any more technical characters. It is a very pretty and graceful little plant.

18. **Carex præcox**, *Jacq.* Thirteen Districts. Doubtless the single one omitted simply from insufficient observation. This common and pretty little plant throws up its conspicuous yellow barren spikelets in moderately dry pastures early in April, contributing, with the early *Luzula* and *Vernal Grass*, greatly to their ornament. When in fruit it is of a uniform dull green, and then is not nearly so noticeable. In shady situations it sometimes grows to a much larger size, and is apt to be thought another species.

19. **Carex pallescens**, *L.* Nine Districts. Really much more widely distributed than this, perhaps to be found in all the Districts. This Sedge stands by itself in the aspect of its pale neat spikelets, whether in flower or fruit. It is a widely distributed plant in Herefordshire, and is not at all particular in its place of growth, occurring both in woods, wet meadows, and upland pastures, in the last of which it is an associate and pretty contrast with *Orchis morio* and *mascula*, *Lady's Mantle*, &c., early in June. It is a plant which is always welcome.

20. **Carex panicea**, *L.* Ten Districts; really it is probable, all. This common Sedge has the habits of, and is often associated with, *C. vulgaris;* though demanding more actual marsh for its nourishment than that species. It is a mark of ground dangerous for sheep during wet seasons, and should be in reality viewed with more suspicion by the farmer than *C. glauca;* along with which species however its blueish foliage may be included in his term "Carnation Grass."

21. **Carex pendula**, *Huds.* Six Districts. This is the giant of the family; and a noble ornament it is to the rill sides in wooded banks, which are the localities it loves; holding its own among such vegetation as *Epilobium hirsutum* and *Angelica sylvestris*, and adding a peculiar form to the general sylvan beauty. This Sedge is perhaps really *scarce;* for when present it can hardly fail of being noticed, from its great size and long pendant tassels of bloom. It is (like *vulpina*) liable to a disease (of insect origin?) in which the fruit is swelled to twice its natural size; but (unlike *vulpina*,) remains undistorted in form.

22. **Carex strigosa**, *Huds.* Eight Districts. This plant, generally considered a rarity, is decidedly not so in Herefordshire. It is as true a *wood* plant as *sylvatica;* but affects damp wood bottoms and rill sides, while that species loves the drier parts. Once seen, neither foliage nor fructification is liable to be mistaken; and it is known from at least 13 separate stations in the county.

23. **Carex sylvatica**, *Huds.* Thirteen Districts. This wood plant is far more common than *strigosa;* and may be termed truly abundant. It is also proportionately prettier, and forms a very graceful ornament to the dry glades of woods in the early summer.

24. **Carex lævigata**, *Sm.* One District. This is quite a recent addition to our county botany. I have been on the look-out for it for years; and came across it this year (1881) in a marshy thicket near Pont-y-spig, growing about three yards from the county boundary. It exhibits a large census number (48) for the whole of Great Britain; still it is decidedly a scarce plant in Herefordshire,

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Monmouthshire, Radnorshire and Breconshire, being sparingly distributed through these counties.

25. **Carex binervis**, *Sm.* Four Districts. This cannot be expected to be a common plant in a county containing so little of heath and mountain as our own. The Llanthony District seems the only one in which it is common; and there, though fairly abundant on the Ffwddog, and on the Cusop hill, I have never met with it on the Hatterel range. It seems to be absent from the Malvern hills, where, or in the Districts adjoining, we should have expected its presence to have been recorded. It occurs on Welsh Newton Common, and in more than one spot in the Ross District, where it is a remnant of a bygone vegetation.

26. **Carex distans**, *L.* Two Districts. The occurrence of this Sedge is interesting, as it is almost exclusively a maritime species. D. Boswell in *Eng. Bot., Ed. iii.*, does not say a word about its occurring in inland stations. Mr. Watson, in *Top. Bot.*, treats its occurrence away from the sea as still (in 1874) an open question. Since that time however it has been recorded for Hertfordshire, Warwick, and south-west Yorkshire. In Herefordshire, it was found first as early as 1853, by Mr. Purchas, at Plowfield; who however did not at that time recognise it as *distans*. In 1879 I found it, in company with Mr. B. M. Watkins, on the Canal bank, near Hereford. It is thus certainly an inland, and certainly a Herefordshire plant; though its stations in our county are likely enough to have been destroyed already, or to be destroyed in a few years.

27. **Carex fulva**, *Good;* with the var. *speirostachya*. Eight Districts. This plant is locally plentiful, and the explanation of its not occurring in more Districts seems to be that it requires unbroken marsh land, which, in Herefordshire, does not exist in abundance. I cannot presume to distinguish between this type and its variety, especially after specimens from a single Herefordshire station have had both names assigned to them, in different years, by the authorities of the Exchange Club. But we certainly have a second plant in Herefordshire, falling under *C. fulva*, Good, which is decidedly and at once distinct from the ordinary one, by its tufted root-stock throwing up abundant herbage of a lighter green. The flowering stems are correspondingly poorly developed, and the fruit not well formed. This plant, which I found in 1880, on the Herefordshire face of the Ffwddog, and again on the same range, just within Breconshire, is, I believe, Dr. Boswell's *Var. C. sterilis*, which he treats as a hybrid. I do not think that *C. xanthocarpa*, found by Dr. Pryor in Hertfordshire (see *Bot. Journ.* for 1876, p. 365), can be identical with this, though our plant agrees with the Hertfordshire plant in the light tufted foliage, and the absence of the white membrane connecting the beaks of the fruit. True *xanthocarpa* is a plant which should be looked for in Herefordshire.

28. **Carex flava**, *L.;* with the variety *lepidocarpa*. Thirteen Districts (really, no doubt, all). Of this plant we certainly have several forms. The plant with a deflexed beak, which I take for true *flava*, occurs in several places, but it is perhaps not so common as that with a nearly-straight beak. This latter again varies considerably in the size and shape of the fruit; but all belonging, I believe, to the variety usually termed *lepidocarpa*. The true *C. Œderi*, Ehrh., I have

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never myself found except within the influence of salt water. Still it should be looked out for in Herefordshire.

29. **Carex hirta**, *L.* "*Hammer Sedge.*" Thirteen Districts. This fine Sedge is widely spread, but hardly abundant in the county. It is a meadow plant, and seems to grow both in dry and wet localities.

30. **Carex Pseudo-cyperus**, *L.* Five Districts. This beautiful plant is locally abundant. It is one of the truly lowland species, loving the brink of stagnant water; ditch, pool, or canal. It is known in several localities in the Ross District, in the meadow ditches of the Wye; but along the brink of the river itself I never found it. It is abundant on the canal bank, near Shelwick. While no British Sedge can touch *C. pendula* for grandeur, this equals or exceeds it in grace.

31. **Carex paludosa**, *Good.* Nine Districts. This, with the next, forms a great part of the larger Sedge vegetation of the brink of slow streams and pools In such situations it is a common plant. Large tracts of Sedge occur in undrained meadow land with little or no fructification, which I believe belong to this species.

32. **Carex riparia**, *Curt.* Eight Districts. The habits and county distribution of this seem identical with the last. *Riparia* is however both the less common plant and less abundant where it does occur. It is the larger of the two; and, especially when the fruit is ripe, is a very handsome plant.

33. **Carex ampullacea**, *Good.* Four Districts. The general distribution of the two *Bottle Sedges* in Britain is reversed in the smaller area of Herefordshire. The present one, which occupies nearly twice as many of the botanical districts of the whole island as *vesicaria*, occupying, in Herefordshire, about half the number of its rival. They have very different habits and preferences; *ampullacea* being far more of a moorland plant, and where it occurs on the lower grounds, (as at Coughton Marsh and Mosely Common in Herefordshire), marking the relics of former moorland, while *vesicaria* frequents alluvial meadow-ditches. It is curious that these two plants, thus distinct in habit, and generally in look, should be closely united by the intermediate *C. involuta* of Cheshire.

34. **Carex vesicaria**, *L.* Seven or eight Districts. The county records of this plant makes it twice as common as the last in Herefordshire, and this is probably not at all too high an estimate; the Districts insufficiently explored being more likely to yield this plant than its congener. This is a plant of lowland meadow ditches, of which, next to *Pseudo-cyperus*, it is perhaps the greatest ornament of all the genus.

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MIMICRY IN FUNGI.

By M. C. Cooke, LL.D., &c.

For thirty or forty years the term "mimicry" has been applied to certain resemblances in plants to those of other species often widely separated from them. It has been objected that the term implies a conscious imitation, of which plants are incapable, and hence another term, that of "homoplasy," has been proposed, but not generally adopted; therefore, with all its imperfections, we prefer to adhere to the one which is best known. We will not assume that the resemblances to which we wish to call attention are other than remarkable coincidences, but even as such they are worthy of note. Although a number of instances have been indicated amongst flowering plants, very slight attention has been paid to these coincidences in cryptogams.* Nevertheless, several instances have been adduced by Mr. Worthington Smith, to which others may be added. These are chiefly confined to the Agaric family, and although some of them striking, they are scarcely so satisfactory as they would have been had the resembling plants been further removed from each other. Thus, one poisonous species, *Agaricus, Hebeloma, fastibilis*, greatly resembling in appearance the edible mushroom, *Agaricus, Psalliota, campestris*, came up in great numbers upon a mushroom bed, and might have caused a disastrous result, had not the fact been detected by an adept. Another instance was that of a mass of fungi which also made their appearance on a mushroom bed. At first sight, these chiefly resembled the variety of an edible species which not unusually comes up in clusters on old beds. It has white spores, with a lobed and undulated white pileus *(Agaricus, Clitocybe, dealbatus)*. The imitating fungus had the same wavy cap, white colour, and fungoid odour, but the spores were pink, and its structural features were distinctly those of quite a different species *(Agaricus, Clitopilus, orcella)*. In this instance both species were quite innocuous. Two wholly distinct but very similar fungi commonly grow together on wood ashes or scorched places, where charcoal has been burnt; these are *Cantharellus carbonarius* and *Agaricus, Collybia, atratus*. In similar localities, and under like conditions, two other diverse fungi are ordinarily found growing together, *Agaricus, Flammula, carbonarius* and *Agaricus, Flammula, spumosus*, but these are very closely allied species. Similarly, also, the closely allied *Agaricus, Hypholoma, fasciculuris*, and *Agaricus, Hypholoma, capnoides*, or another pair, *Agaricus, Flammula, alnicola*, and *Agaricus, Flammula, conissans*, are scarcely unexceptional instances, as compared with each other, but either of the first may be taken with either of the last pair, and the coincidence of colour, form, size, mode of growth, and even habitat, is complete. With any of these the recently described *Agaricus, Clitocybe, Sadleri*, with white spores, have a striking resemblance. So that here we have five yellow species found growing on wood, to which three or

* *Gardeners' Chronicle*, February 10th, 1877.

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four others might be added, were they not so closely allied to those already named,* and an ordinary observer would regard all as the same species. There is, however, a small Agaric, which is known to the majority of mycologists from its strong odour of stinking fish *(Agaricus cucumis)*. It grows on the ground, and upon fragments of dead wood, and has red-brown spores. Yet there is an imitator in a small fungus with white spores, found in just the same localities, with the identical fishy odour. According to all authority and experience, the difference in the colour of the spores is not a mere difference of species, but indicates quite a separate and distinct group of species.

Two other species, one having white spores *(Agaricus, Clitocybe, parilis)* and the other pink spores *(Agaricus, Clitopilus, popinalis)*, have very strong external resemblances, and yet they are often found growing together. And two very similar forms, each with an excentric stem, found growing on trunks, are so much alike in general aspect, that it is absolutely impossible to distinguish the one from the other, except by the colour of the spores, which, in one instance, are white *(Agaricus, Pleurotus, ostreatus)* and the other rosy *(Agaricus, Claudopus, euosmus)*. They will grow together on the same tree, and in the same season of the year, whereas the white spored species is edible, and the pink spored one is said to be deleterious.

We might also instance *Agaricus, Tricholoma, nudus*, a handsome violet species, which, when well grown, is scarce to be distinguished from *Cortinarius violaceus*, except that, in the former, the spores are white, and in the latter rusty. Then, also, there are *Agaricus Tricholoma, russula*, and *Hygrophorus erubescens*, often so much alike that some mycologists contend that both are the same species. A similar remark applies also to *Agaricus, Mycena, balaninus*, and *Marasmius erythropus*. In fact, we need not multiply instances, as every mycologist knows from experience that very many of the species have their analogues in other sections, from which, at a casual glance, it is difficult to distinguish them.

Taking a still wider range of comparison, the *Balanophoreæ*, a family of flowering plants, are in their parasitic habits, form, colouring, and odour, close imitators of fungi. And even if we confine ourselves to the Cryptogamia, we find amongst Algæ, in the species of *Nostoc*, a great likeness to *Tremella* amongst fungi. And so again in Lichens we have *Lecidea*, scarcely distinguishable, except by experts, from *Patellaria*, a genus of fungi. And *Bæomyces* amongst Lichens resembles *Stilbum* in fungi; as also the Graphideous Lichens are imitated in *Hysterium*, and *Platygrapha* in *Stictis*. Equally startling are the resemblances between widely separated groups of fungi, as, particularly, the entire Hypogæous *Gasteromycetes*, which in form, size, odour, habit, and all, save fructification, imitate the Truffles *(Tuberacei)*. *Podaxon*, again, in appearance resembles *Coprinus*; and *Hypolyssus* might be mistaken for an immature *Crucibulum*. *Verpa* has the form of a *Phallus*, but deficient in a volva. The largest species of *Wynnea* might almost be mistaken for a *Sparassis* if the fruit were not examined. And *Clavaria* has its club-shaped forms repeated in *Cordyceps* and *Geoglossum*, with its

* As *Ag. inopus*, *Ag. epixanthus*, and *Ag. elæodes*.

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branched forms in *Lachnocladium*. The species of *Craterellus* are not unlike large *Peziæ*, and the smaller forms of the latter genus are represented in *Cyphella*, where some correspond to *Hymenocypha*, others to *Mollisia*, and others to *Dasyscypha*.

We have not designed to do more than to suggest a subject for reflection, and not by any means to exhaust it. Neither shall we attempt to demonstrate the "why and wherefore" of such coincidences. For the present we are content to regard them simply as *coincidences*, although, in some cases, so striking that we are loth to consider them accidental, but that they have a cause, and are a mystery which we are at present unable to account for or explain.

FUNGI IN THE DOLOMITES.

By Mr. T. Howse, F.L.S.

I am afraid that some of my friends who have the misfortune to listen to this paper, will remark that the fungi in it shine by their absence.

But the object of my little paper is merely to point out to English mycologists the best localities for fungi in Tyrol; to show them where to go, rather than what to look for.

My rather frequent visits to the eastern Alps have always taken place in July and August, when few fungi are to be seen. It is still an unrealized project of mine to visit South Tyrol in October. Perhaps some of the distinguished mycologists present, annoyed by the gradual retirement of interesting species from the neighbourhood of Hereford, may some day offer to accompany me.

The best head-quarters for mycologists visiting the Dolomites are the villages of Paniveggio and St. Martino di Castrozza. Both these places, with cheap and comfortable inns, are 5000 feet above the level of the sea, and are surrounded by the finest forests in Tyrol. These forests belong to the Crown; the peasants are therefore not allowed to cut them down. The pine trees consequently attain an abnormal size. Above the forests rise the noble ranges of the Primiero Dolomites; a grand succession of rocky pyramids, shattered towers and slender pinnacles, which for years baffled the best climbers of the Alpine Club. But the mycologist will find ample occupation below, and when bewildered with the profusion of novel Agarics, he may refresh his faculties by gazing at the glorious scene around him.

I noticed, amongst other things, a large number of very fine *Pezziza macrocalyx*, and several novelties in *Russulæ*. Auronzo would be a good centre for head-quarters; I observed a great many fungi in the neighbouring woods, especially a very curious *Hydnum*, new to me. Upper Styria is noted for having the wettest climate in the Alps. It is called "green Styria," from the mountains being clad with forests almost to their summit, and is a splendid fungus country.

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The best head-quarters will be found in Schladming, Trieben, and Admont. I observed a great variety of *Cortinarii* near Admont, and an abundance of Kalchbremer's *Boletinus cavipes*, on the Bösenstein mountain, near Trieben.

I noticed this curious fungus also in the Zillerthal, and shall never forget the feast, my friend Evers, of Innsbruck, and myself enjoyed at Breitlahnen, in that valley. We had gathered a large quantity of a small Alpine form of puff-ball, and had them boiled with the soup for dinner. What trouble we had to induce the landlady to cook them, and how great her astonishment when both she and some fellow-travellers found them delicious.

I shall also not forget being made very unwell at Primiero, by partaking of a dish of Chantarelles, of ancient date, which the host had prepared to please his mycological guest.

Respecting the edible fungi of Tyrol, all I could ascertain was that *Cantharellus cibarius* was the only fungus eaten. All others, even *Boletus edulis*, which is abundant, are unknown as articles of food.

In conclusion, I beg to inform anyone visiting the Alps, that Bredasola is publishing figures of the Tyrolese fungi. He lives in the Val de Rabbi, near Trient. I have little doubt but that the new and interesting fungi he figures, may be found in the more accessible localities described in this paper.

PROTOCOCCUS.

By Rev. J. E. Vize.

According to some authors *Protococcus* takes its name from two Greek words signifying first or elementary fruit, from the idea that its structure is elementary; according to others, from first berry, from its likeness to a berry. It is in reality one of the unicellular *Algæ*, which are plants consisting of single cells, either combining together in few numbers in groups, or solitary. There is still much imperfect knowledge with regard to these minute plants, inasmuch as their structure is very much like the organisms of the *Palmellaceæ*, which are *Algæ*, and also like the gonidia of some lichens, so much so as to be scarcely distinguishable from them. Much research is needed to make their life history from beginning to end more satisfactory than it is, their very minuteness making the study complicated.

In *Protococcus viridis*, which is found all through the year growing on the trunks of old trees, less frequently on walls, we have the frond of the *Alga* in its ordinary form, which is more or less rotund. It exists in two states,—there is the active motile form, and there is the resting one. In the former of these—the motile form—the plants increase by subdivision, and may be found in an active state. Amongst them are some which have cilia, generally speaking two cilia, which are very much like zoospores: they are projected through the gelatinous cellulose case which originally enclosed them. They move about with the cilia

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for a time, but at last become stationary like their neighbours. The resting state, as the name implies, is one of repose, in it they germinate in due course of time, after having formed for themselves a thickish envelope. This plan enables them to propagate again. It is a singular thing that in this resting state they are vastly better for having been allowed to dry up. It seems contrary to our notions that fresh water *Algæ* should not be utterly destroyed unless they were under the influence of moisture; but it is a fact that their development does require absolute dryness, or if not required it is no earthly disparagement to them. I remember a friend telling me, that on a certain occasion, after an absence from home of some weeks, to his great disturbance of mind he found, on his return home that his servants had tidied up his room, and in doing so had emptied some of his bottles; amongst them was a bottle of *Protococcus*. After it had been unattended to for some weeks, he put some water into it, and to his intense delight and astonishment, soon found a rich colony of *Protococcus* full of life. I recollect reading somewhere a suggestion, that the *Diatomaceæ* are eccentric in their habits. We know that they are found in peculiar places, where occasionally they are very dry, such as the trunks of trees, the corners of windows in railway carriages, &c. A drenching of wet does not suit them in reviving, but a gradual moistening does, such as dew or fog. So also many of our snails and slugs are quite dormant in dry seasons. If they cannot find a moist cool place, they form a false operculum, and so are free from attacks of many creatures which otherwise would prey upon them. This false mouthpiece is gradually dissolved when rain comes, and the mollusks again become active. So with *Protococcus*. *P. viridis* at certain times of the year fringes the edges of pools with a green scum, and as the water recedes they get that amount of dryness which, so far from being an injury to their life, seems to be so highly important to their perpetuity.

Exactly corresponding to this state of life we find *Protococcus pluvialis*, inhabiting, amongst other localities, the ends of waterpipes, spouts, and gutters, which at times, as in the heat of summer, become as dry as bricks, but as soon as a shower of rain comes, *Protococcus* becomes wide awake, and quite ready for its mission in life. The ready appearance of *Protococcus* is extraordinary. In houses before their structure is complete, before they are out of the builder's hands, it exists. If it can gain a position anywhere it avails itself of its posture. The wind no doubt is a useful agent in effecting this, and conveys it as opportunity occurs, to various localities.

It has been said that *Protococcus viridis*, when enormously developed, produces, under certain conditions, what is known as the red snow, figured by Greville (Sc. Crypt Fl., fig. 231,) as *P. nivalis*. The word *viridis* certainly seems inapplicable to *nivalis*, as also does the term *red* to *snow*. But it must not be forgotten that certain states of *Protococcus*, although green, do become transformed to red. Dr. Harkness, a friend known to most of us, sent me some red snow from the United States of America, a few months since: unquestionably, on arrival, it was far redder than snow. Not only has the redness faded, but the crusting over the plant has considerably thickened, and there is a large preponderance of green

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plants; whereas, to the best of my memory, there were not any green plants at first.

This red snow occurs in Rabenhorst's *Flora Europæa Algarum* under the euphonious title of *Chlamydococcus nivalis*. He gives the same genus to *pluvialis*, placing them both in the family *Volvocineæ*, but *Protococcus viridis* he classifies under the family *Protococcaceæ*, thus widely separating them, not only as to genus, but wider still, as to family.

THE FUNGI WHICH ATTACK WHEAT.

By the Rev. J. E. Vize—Read October, 1881.

These vegetable forms may be divided into two sections, those which injure the corn itself, and those which find support upon the straw. The most fatal to the wheat itself is *Tilletia caries* (Tul.), called bunt. It is generated in the ovary of the wheat at a very early stage of growth, before the ear has appeared outside the sheath. Bunted ears of wheat are not difficult to detect at a glance from healthy ones, because the disease has the property of making the plants attacked by it much more luxuriant than they otherwise would be. The result of the ovary being thus attacked is that instead of the grain of wheat being filled with starch, a powdery paste is produced, which, in an early stage, when squeezed, is very offensive to the smell. The spores of *Tilletia* when in the young state have short hyaline pedicels, which, however, disappear as the spores become dry and ripe. If the fungus be very abundant, the damage done to the crop is calamitous to the farmer, as the wheat is almost unsaleable, except, as has been remarked, to those who make inferior gingerbread, in which case the black spores of the bunt only make the gingerbread a little darker, the unpleasant taste being concealed by the sweetness of the treacle used.

The fungus next to bunt as to damage in wheat is smut, *Ustilago carbo* (Tul). This is not so important as the *Tilletia*, because the dusty spores burst their cases much more easily, and so get scattered; also in the threshing machines, as well as the winnowing fans of the flour mills, they are separated from the wheat. Still, they are unsatisfactory, not only to the general look of the growing crop, but also to the fact that the ear of wheat would be much better and more profitable if filled with flour than with a densely black powder. Smut is the dusty mass into which the substance of the receptacle of the germen, and the base of the glumes is converted. The relative sizes of the spores of bunt and smut, as shown by the microscope, are—smut, ·0002 of an inch; bunt, ·0006 of an inch. The former are simple, the latter reticulated, and therefore more pleasing to the sight. One contrast between these two fungi is that you may inoculate an ear of wheat with the spores of bunt successfully, but you cannot do so with smut.

As to the fungi which attack other parts, the next in importance as to injury

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seems to be rust, *Trichobasis rubigo vera* (Lev.). In damp seasons its presence is very easily detected on the stems and leaves, especially the latter. It is of a yellowish red colour, and bursts from under the cuticle where it first forms. It is not of special interest or beauty when magnified. Probably the rust does not materially affect the crop. It is followed by *Puccinia rubigo vera* (De Cand). There is another rust which affects the straw of wheat, and is the young state of *Puccinia graminis* (Pers.), but neither this, nor the one which we have just considered, materially affects the crop, as they do not appear until the ear of corn is well formed; the mycelium may slightly impair the circulation of the sap, and also damage the chlorophyl, but by this time the plant is getting mature. *Puccinia graminis* is found abundantly on the straw late in the season. Its presence is detected by black patches more or less elongated, scattered, and bursting through the cuticle of the straw. This brand (for such is the English term for the *Puccinia*) will easily be recognized, when highly magnified, by its having the spore divided by a septum, and by its pedicel or foot-stalk. Then, as the age of the straw increases, you will find other fungi attacking it, if the necessary conditions for their growth are present, such as temperature, moisture, and other qualifications. *Cladosporium herbarum* (Lk.), the young form of *sphæria herbarum* (Pers.) is to be discovered the former with its stalk, on the top of which is the spore, the latter with its beautiful sporidia, so yellow and multicellular, numbering generally eight within the ascus. Both these forms are very common on wheat, as on many vegetables. You get also *sphæria culmifraga* (Fr.), not differing very much from *sphæria herbarum*, as to colour and beauty. *Erysiphe graminis* (D.C.), succeeding its young state, which in the conidiiforous form is *Oidium monilioides* (Lk.) is to be found in some seasons. Also, very rarely, you may meet with the scelerotium of the medicinal *Claviceps purpurea* (Tul.), called in English "Ergot of Rye." This scelerotium is really a mass of felted mycelium which must for months be kept suitably moist to become *claviceps*. Then, later on, when the straw is decayed from moisture, you find the bristle mould, *Chætomium elatum* (Kze), with its bristles standing erect, supporting the sporidia at their base. These and others all aid in bringing back the straw of wheat to the original chemical component parts of which it was formed to the parent earth and air again, and so preparing the land once more for the purpose to which the Creator asigned it.

Before closing the subject of the fungi connected with wheat, it will not be out of place to allude to the vast importance of a fungus called *Saccharomyces cerevisiæ* (Meyen) which affects the flour of wheat favourably for mankind, and without which it would be impossible to have a good loaf of bread. The fermentation of dough is caused by the barm acting upon the flour, in consequence of which the growth of a *Torula* is produced. The more the dough increases in bulk the greater is the increase of the fungus. When sufficiently increased, and the dough is put into the oven, the baking process, through the great heat, destroys the *Saccharomyces*, and generates a gas instead, thereby making the loaf light, thus proving to us that, although minute fungi are generally considered diseases, the so-called diseases may result in great blessings.

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MONSTROSITIES IN FUNGI.

By Mr. WILLIAM PHILLIPS, F.L.S.

[With Plate.]

MR. PHILLIPS called attention to the frequent occurrence of monstrosities in the *Hymenomycetes* and other fungi recorded by different authors and observed in the course of the Forays of the Club. Referring to the works of Dr. Masters, Mons. de Seynes, and Mr. Worthington Smith in this field of study, he exhibited a series of drawings copied from various sources, with some original ones made by himself, together with a very remarkable *Polyporus*, found in a cellar, the stems of which were drawn out to a great length; and repeatedly branches, supporting small convex heads or pilei, with little or no hymenium developed. Proceeding with his subject he said: "Diversified and curious as these monstrosities are, they all seem capable of being classified under the following heads:—Adhesion, Prolification, Hypertrophy, and Atrophy. But it is by no means easy to assign some deformities to their proper cause, and opinions are found to widely differ when an explanation is asked for. Before proceeding to enumerate and describe the malformations that have been observed, it may be well to call attention to the general structure of the *Hymenomycetes*, as it will throw some light on the ease with which they unite with each other or become altered by external impediments to their growth."

"By the germination of the spores, a much-branched mycelium, consisting of cellular filaments, is produced, which may either form itself into dense balls, called sclerotia, capable of surviving for at least twelve months, and then giving rise to perfect plants; or, after forming a loose cottony layer, producing at once little spherical or conical balls, composed of radiating or parallel hyphæ, growing at their apices, which develope into perfect plants. Supposing it to be the mycelium of the common mushroom, we shall see it as a white woolly mass, occupying the interstices of the soil, and enveloping in its web anything that happens to come in its way, so that if we attempt to separate it from such accidental accretions, we find it exceedingly difficult to do so. Where portions have become divided by impediments of this kind, the mycelium finds no difficulty in uniting again on the opposite side of the impediments, thus showing a property at this early stage which we shall see hereafter follows it even when it has assumed its perfect fructification in the form of a mushroom. The mushroom, in fact, is but a modified condition of the mycelium, for if we examine, by the aid of the microscope the stem and the pileus, we find them composed of parallel cellular filaments or hyphæ, growing vertically up to the top of the stem, and then gradually taking a horizontal and radial direction for the purpose of forming the pileus. Some of the hyphæ terminate on the upper surface and margin of the pileus, having thus performed their work of building up and strengthening the fabric, while a more important duty devolves upon other portions, namely, to take a new direction down-

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wards to form the trama of the gills. In the formation of these gills the cellular filaments or hyphæ take yet another direction—the fourth since they commenced to form the juvenile plant—in a horizontal line, when they immediately begin to discharge their most important function, that is, producing the hymenium or spore-bearing surface. Before doing this, however, they undergo a differentiation which is well worthy of study. The cells, of which they are made up, become much shorter, indeed, almost globular or polygonal, and constitute the sub-hymenial tissue, which is an extremely thin layer, not unlike the succulent parenchyma of flowering plants, except being devoid of chlorophyll. From the outer cells of this tissue are produced club-shaped cells, mostly placed horizontally, and closely pressed against each other, forming the hymenial layer. Some of these club-shaped cells remain sterile, while others become basidia, whose work is to produce the reproductive bodies or spores. This they do by throwing out at their summits two short slender spicules, on the ends of which are produced the spores, which, when ripe, drop off and in due time germinate, and so commence again the cycle of life I have described. What holds good in the common mushroom, holds good, with some slight differences in most of the higher *Hymenomycetes*, and it will be evident from this brief sketch, that we have a class of plants before us, composed, for the most part, of a rapidly-growing, soft, filamentous tissue, easily turned out of its direction of growth by any more resisting substance, but capable of reuniting again with great facility when the obstacle is passed; hence we often find grass stems, branches of shrubs, and other objects holding their position, in the flesh of the stem or pileus of *Agarici*, *Polypori*, *Hydnei*, &c., or causing a separation at times where union is afterwards impossible, thus giving rise to deformed specimens. The character of the tissue lends itself also to the formation of unions by adhesion, so exceedingly common, such as where two individuals of the same species become joined in their stems, either partially or throughout their entire length, or in their pilei while their stems are separate, or in their stems and pilei at the same time. These unions become so perfect,—that is, the cellular tissue is so intimately interwoven,—that the line of union cannot be detected even by the microscope, and can only be inferred from a depression according with the line of juncture. This has been noticed in *Agaricus procerus* (t. fig. 1), *A. campestris* (fig. 2), *Lactarius serifluus* (fig. 3), *Russula alutacea* (fig. 4), and many others."

"A much more curious fact, attributed to adhesion, is that of an *Agaric* bearing on the top of its pileus one or more pilei of the same species in a reversed position—that is with the gills uppermost—sometimes without a stem, at others with one (figs. 5, 12). This has been observed in *Agaricus phyllophilus* (fig. 5), *A. campestris* (figs. 6, 12), *A. fascicularis* (fig. 7), *A. fimicola* (fig. 8), *Russula vitellina* (fig. 9), *R. nigricans* (fig. 10), and *R. fragilis* (fig. 11), and doubtless in many other species not recorded. It has been accounted for in the following manner:—In a group of young plants two or more have been so situated, owing to the inequalities of the surface on which they were growing, that their pilei have adhered together, and the most vigorous has lifted the others from their attachment, and continued its growth with these captive pilei on its head. In the example of *Agaricus phyllophilus* sent me by Mr. Plowright, there are no less than eight reversed pilei

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present. I show a sketch (fig. 13,) which will enable you to see the manner in which this monstrosity is brought about. It is not an infrequent thing to find a young pileus situated beneath the pileus of an older plant amongst the gills, attached by its upper surface (figs. 14, 15). This has been explained by supposing that a young individual had commenced to grow from the ground beneath the expanded pileus of its older neighbour, and pressing against its gills had adhered, and at length become detached from its own stem, decapitated in fact, and carried up by the more vigorous growth of its captor. This explanation will not apply in all cases, for if, as in *Agaricus campestris*, a thick and somewhat substantial veil be present, one cannot understand how a neighbouring individual can penetrate the veil. M. De Seynes gives a very satisfactory account of how it may happen in a veiled species. He suggests that a supplemental receptacle is produced within the veil by prolification, as we shall presently see may easily be, and that its pileus is annexed by the parent plant; and he figures a case which came under his own observation, where the remnant of the ring still remained below the point at which the supplemental receptacle issued from the parent stipes (fig. 14)."

"One more monstrosity from this cause deserves to be reproduced here, differing from those already noticed in being an adhesion between the parts of the same receptacle. An *Agaricus pulverulentus*, P. (fig. 16), is represented with its pileus extending down the whole length of the stem, attached by its inner margin, from which the gills proceed in a horizontal direction to the outer margin. A portion of the pileus must have become firmly united in infancy, and become lengthened out as the stem elongated, after the fashion of a bat's wing."

"We now come to consider monstrosities arising from prolification. These may be divided into *inferior*, *superior*, and *included*, *i.e.*, those situated below, those above, and those within the substance of the pileus. It will be obvious that in relation to so simple an organism as is presented to us by one of the higher *Hymenomycetes* the word prolification must necessarily have a much more limited application than when employed of the vascular cryptogams and the phanerogams. A perfectly developed *Agaric Hydnum* or *Polyporus* is regarded as an organism the main function of which is the production of spores, which are the reproductive bodies, on a hymenial surface, and hence the entire plant is called a sporophore, or by some a receptacle. Prolification therefore means here the production, by a parent receptacle, of one or more daughter receptacles; or that part of a receptacle that bears the spores, as, for example, a supplementary hymenium."

"One of the most familiar examples of what I prefer to call inferior prolification is that of *Agaricus racemosus*, Pers., familiar, not because of its being frequently met with, for it is one of the rarest of the genus, but because it was described and figured by Persoon so long ago as 1797, and has been reproduced by subsequent authors (fig. 17). It is a small and slender species, bearing through the whole length of its stem numerous supplementary receptacles, very much smaller than the parent plant, the pilei not being larger than a pin's head. An analogous instance is that of *Agaricus Aueri*, Nees d' Essenbeck (fig. 18), if it be not really another form of the same species; and a specimen of *Agaricus nanus*, Bull, was observed and figured by M. De Seynes, in which a number of young receptacles are

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produced low down on the stem in the same fashion (fig. 19). An instructive example of a like kind was described and figured by Mr. Worthington Smith, in the *Gardeners' Chronicle*,* in which *Agaricus laccatus*, Scop., produced many filiform stems, surmounted by small pilei (fig. 20). The secondary pilei in these instances were not perfectly developed, and a sceptic may dispute their claim to be true receptacles. I will give cases where no doubt can possibly exist. My friend, Mr. Plowright, sent me a specimen of *Agaricus stans*, having a fairly-well developed secondary receptacle, with a pileus a quarter of an inch across, and a stem nearly half an inch long, arising from the parent stem, about half-way up from the base (fig. 21). Mr. Worthington Smith gives a figure of *Lactarius quietus*,† in section (fig. 22), with a supplemental receptacle, and other instances might be added were it necessary.

"I will now direct your attention to a few facts illustrative of superior prolification. To this category belongs a very singular monstrosity figured by Mr. Worthington Smith, in the *Journal of Botany*, of *Boletus edulis*, Bull, on the pileus of which were seated two supplementary receptacles; the one in which the pileus was not supported by a stem, the other in which a perfect and proportionate stem was present (fig. 23). It may be contended, but in my mind without adequate reason or probability, that the two supplementary receptacles were developed on the soil immediately above where the elder receptacle was being developed, and were lifted up by it. It is much easier to believe that it is the result of prolification, which, if it will account satisfactorily for the facts already cited of receptacles produced from the stipes, may equally well account for this. But take fig. 9, which represents a section of *Russula vitellina*, on the pileus of which a secondary receptacle is thrown up, having no semblance whatever of being an independent plant, and if it is accepted in the one case it may be in the other.

"I am disposed to refer two curious monstrosities to this cause which came under my own observation very recently. The first was a plant of *Paxillus involutus*, which had formed a hymenial surface on the top of its pileus, of limited area and of a curiously reticulated form, resembling the hymenium of a large grooved *Polyporus* (fig. 25). The other was a *Hydnum repandum*, on the upper surface of the pileus of which were found clusters of upright spines exactly similar to the normal ones beneath. Detached groups of spines were also formed on the upper part of the stem, but this is not so unusual a circumstance (fig. 26).

"One solitary instance of included prolification came under my notice some time since, of which I have never seen a similar case recorded. Amongst a number of specimens of *Agaricus campestris* bought in Shrewsbury market, I observed one which possessed a remarkable umbo, and on cutting the specimen perpendicularly through the umbo, I found it to be caused by the formation of a hollow space in the form of a small pileus, with perfect gills radiating from a common centre, but with no trace of a stem (fig. 27). It was seated entirely within the flesh of the pileus, some distance below the cuticle. No conceivable cause of this phenomenon can be alleged except prolification.

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* *Gardeners' Chronicle*, July 26th, 1873.

† *Gardeners' Chronicle*, 1876.

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DESCRIPTION OF PLATE.

1. *Agaricus procerus*, Scop. After W. G. Smith (reduced), *Gard. Chron.*, 1873.
2. ,, *campestris*, Linn. After De Seynes (reduced); Bull, *Soc. Bot. France*, V. xiv. (1867), tab. v., fig. 8.
3. *Lactarius serifluus*, Fr. Reduced.
4. *Russula alutacea*, Fr. After W. G. Smith (reduced), *Jour. Bot.*, 1869, t. 99.
5. *Agaricus phyllophilus*, Fr. C. B. Plowright.
6. ,, *campestris*, Linn. After De Seynes (reduced), l. c., t. vi., fig. 4.
7. ,, *fascicularis*, Huds. Section (reduced) of specimen by Mr. Green, Bristol.
8. ,, *fimicola*, Fr. After De Seynes (reduced), l. c., t. vi., fig. 1.
9. *Russula vitellina*, Fr. Section (reduced), after W. G. Smith, in litt.
10. ,, *nigricans*, Fr. Reduced. Found near Shrewsbury.
11. ,, *fragilis*, Fr. Reduced. From C. B. Plowright.
12. *Agaricus campestris*, Linn. Section (reduced), Master's *Teratology*, fig. 24.
13. ,, ,, Linn. Showing how pilei may become attached to the pileus of an older individual.
14. ,, ,, with a pileus attached beneath; *(a)* remains of stem and veil.
15. ,, *polygrammus*, Bull. Section (reduced), after W. G. Smith. Exhibited by the Rev. W. Houghton, at Hereford, 1871.
16. ,, *pulverulentus*, P. After W. G. Smith (reduced), *Gard. Chron.*, July 26th, 1873.
17. ,, *racemosus*, Pers. After Persoon (reduced), *Dispos.*, t. iii., fig. 8.
18. ,, *Aueri*, Nees. After Nees (reduced), *Nova Acta Acad. Lcop.*, ix., tab. vi., fig. 18.
19. , *nanus*, Bull. After De Seynes, l. c., t. v., fig. 3.
20. ,, *laccatus*, Scop. After W. G. Smith (reduced), *Gard. Chron.*, July 26th, 1873.
21. ,, *stans*, Fr. Sent me by C. B. Plowright.
22. *Lactarius quietus*, Fr. Section (reduced), after W. G. Smith, in litt.
23. *Boletus edulis*, Bull. After W. G. Smith (reduced), *Journ. Bot.*, l. c.
24. *Agaricus fascicularis*, Hudson. A section (reduced), after W. G. Smith, l. c.
25. *Paxillus involutus*, Fr. Found at Shrewsbury.
26. *Hydnum repandum*, Linn. Found at Shrewsbury.
27. *Agaricus campestris*, Linn. Found at Shrewsbury.
28. ,, *campestris*, Linn. After W. G. Smith (reduced), *Gard. Chron.*, July, 1873.

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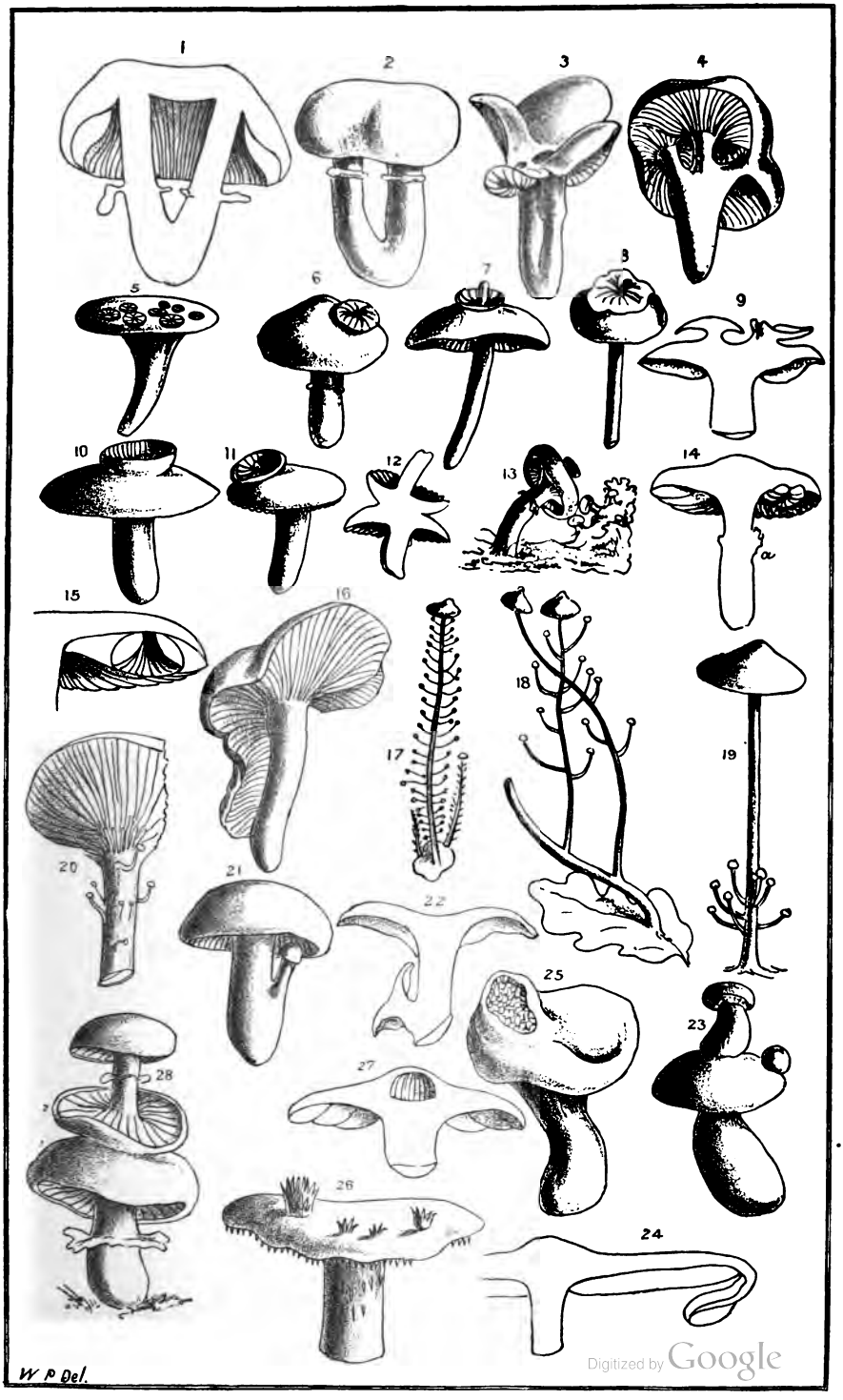

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MONSTROSITIES IN FUNGI.

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"I must pass over monstrosities arising from hypertrophy, although many interesting examples may have been given, but they present no special difficulty as to their cause, and the same may be said of those produced by atrophy. The cellar *Polyporus* exhibited this evening is an example of both of these causes combined—hypertrophy having caused the enormous elongation and multiplication of the stems, and atrophy having reduced the pilei to insigificant dimensions.

"Before concluding my remarks, I must call attention to two very curious and perplexing monstrosities of which I am unable to give any satisfactory explanation. Mr. Worthington Smith described and figured* a plant of *Agaricus campestris* (fig. 28) which had on the top of its pileus a reversed pileus (quite half the size of the parent) from which ascended a stem duly furnished with a ring, and surmounted by another pileus with the gills downward. It is possible to account for the reversed pileus and stem by adhesion, as in cases already referred to under that head, but not so the uppermost pileus. I venture to submit to you the only explanation I can think of. Let us number the three pilei, calling the lower No. 1, the one reversed No. 2, and the top one No. 3. Supposing No. 2 to have been pressed by an accident of growth against No. 1, adhesion would take place, and No. 2 would be drawn from its attachment by the more vigorous growth of No. 1, and hoisted upside down so that its stem would be in the air. This stem would then reverse its direction of growth, and proceed to form a new pileus on its upturned extremity, deriving its nourishment from the tissue of No. 1, with which it had become perfectly united.

"The same gentleman represents an *Agaricus fascicularis*, the pileus of which extends beyond the normal gills, bends downwards, and then takes an almost horizontal direction towards the stem (fig. 24). On the portion extending beyond the normal gills, another series of gills is formed, and again on the opposite surface is a third series. These several series may be the result of interrupted and renewed growth, or may be another curious instance of prolification.

"No one has ever yet observed, as far as I know, a case of adhesion between two individuals of different species. I exclude cases of parasitism.

"I have thus glanced at a few of the more typical examples of monstrosities amongst the higher *Hymenomycetes*, and would conclude by expressing the hope that mycologists will regard this subject as one worthy of more extended study, and pass over no specimen they may find without making careful notes and observations.

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* *Gardeners Chronicle*, July, 1873.

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ON THE FUNGOID DISEASES OF THE TOMATO.

By Mr. C. B. Plowright—Read October, 1881.

During the autumn of last year (1880) I carried on a series of investigations concerning the various fungi which deleteriously affect the tomato, having the opportunity of examining any and every diseased specimen of tomato which occurred in a large tomato growing establishment near King's Lynn.

Tomatos grown in the open air in this country are a very uncertain crop, sometimes proving a very profitable venture, but not unfrequently the reverse. The tomato disease is almost as well known to gardeners, and as much dreaded by them, as the potato disease is. A very large number of out-door diseased tomatos were examined by me last year. The appearance of diseased tomatos is so well known that it is almost unnecessary to give any description of it beyond stating that they have a peculiar bruised look, and are more or less mottled with black or dark brown patches of disease. These patches increase in size after the fruit has been gathered, to such an extent as to render it valueless. If the tomato be examined in this state, he must indeed be an acute mycologist who could demonstrate the fungus which has caused the disease, for, barring a few hyaline mycelial tubes permeating the substance of the fruit in and towards the margins of the spots, nothing adventitious can be detected. At any rate, I was quite unable to find any perfect fungus upon the numerous specimens I then examined, which could with certainty be credited with causing the mischief. This is not to be wondered at when it is remembered how rarely we are able to discover the perfect *Peronospora infestans* upon the diseased tubers of the potato. On September 10th of this year, a specimen of a typically diseased tomato was brought to me, with the information that although the tomato was diseased the plant which had produced it was healthy. I at once visited the spot, and examined the plant in question. Sure enough the tomatos on it were diseased to a large extent, but the plant looked healthy. A few dead-looking spots were observed upon the lower leaves, which were examined with a pocket lens, but not very thoroughly, as it was raining at the time. When, however, these dead-looking spots were examined microscopically, they were found to be due to the presence of *Peronospora infestans*. The fungus was not producing its conidiophores very abundantly, but still there it was without doubt. The central portion of the spots where the *Peronospora* first made its appearance were now nearly free from it, it being more or less confined to the circumferential portions of the spots. The appearance of these spots was quite unlike the spots produced by the same fungus upon the potato leaf. On the tomato leaf the spots lack the black rotting look which is so characteristic of the potato disease. The tomato leaf is larger and harder, so that instead of putrefying it rather dries up; the spots themselves look more like the sun-scalds one sees upon the leaves of plants grown under glass. After diseased tomatos have been gathered a short time, decomposition rapidly sets in, and they then harbour an incredible quantity

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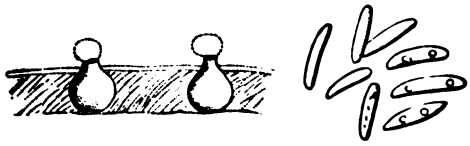

FIG. 1.—SPHÆRONEMA LYCOPERSICI. PERITHECIA AND SPORES HIGHLY MAGNIFIED.

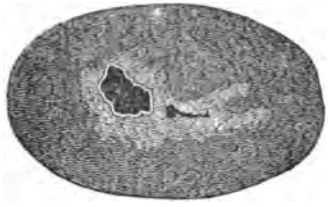

FIG. 2.—THE "BLACK SPOT" UPON THE CROWN OF A RIPE TOMATO. NATURAL SIZE.

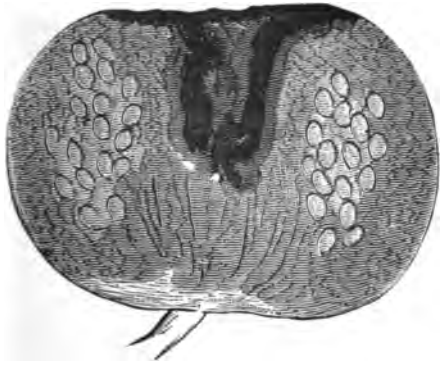

FIG. 3.—SECTION OF FIG 2.

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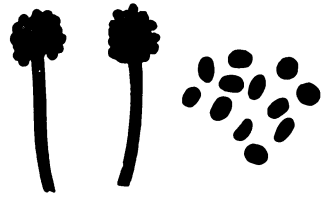

FIG. 4.—SPOROCYBE LYCOPERSICI AND SPORES: HIGHLY MAGNIFIED.

FIG. 5.—CLADOSPORIUM LYCOPERSICI: HIGHLY MAGNIFIED.

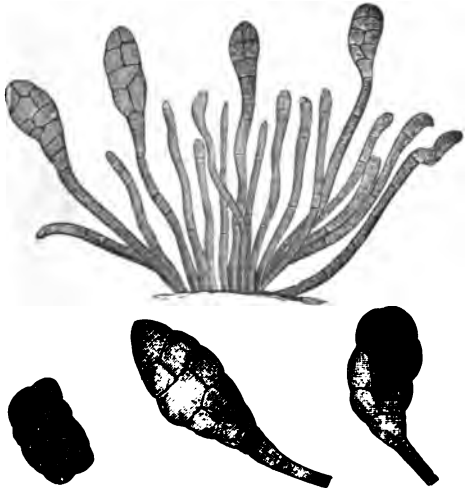

FIG. 6.—MACROSPORIUM LYCOPERSICI (M. TOMATI RAV. ?): HIGHLY MAGNIFIED.

From an electrotype supplied by 'The Gardeners' Chronicle."

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FIG. 7.—PHOMA DESTRUCTIVA. PERITHECIUM AND SPORES HIGHLY MAGNIFIED.

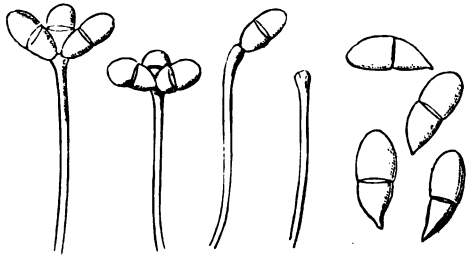

FIG. 8.—DACTYLIUM LYCOPERSICI: HIGHLY MAGNIFIED.

From an electrotype supplied by "The Gardeners' Chronicle."

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of fungi. But as these fungi are, as a rule, only such as are found upon almost all decomposing vegetable matter, it is useless to enumerate them. One species, however, seems to me worthy of special note, as when it appeared upon a tomato, the latter underwent very rapid decomposition. The fungus is, I believe, an undescribed species of *Sphæronema*, of which I have given a figure (fig. 1); it may be thus described:—

Sphæronema lycopersici, n. sp.—Perithecia minute, spherical, arranged somewhat concentrically upon the surface of diseased tomatos. Each perithecium surmounted by a dirty flesh-coloured globule of spores. Spores minute, cylindrical, or somewhat sausage-shaped, hyaline, either with or without nuclei. On outdoor tomatos, Clenchwarton, King's Lynn, Oct. 1880. Perithecia about 150 mk. in diameter. Spores 10 by 2—3 mk.

The diseases of the tomato to which I have given most attention, however, have been those peculiar to fruit grown under glass. It is worthy of remark that the *Peronospora* disease does not occur under these conditions; at least if it ever does do so it is very uncommon.

The first and most important disease to which I would call attention is of frequent occurrence, and may be termed for distinction's sake the "black spot" (fig. 2). It makes its first appearance usually (but not invariably) upon the green tomato as a circumscribed brownish spot, of no great size, upon the crown of the fruit, usually near the remains of the style. As the tomato ripens, the spot has a whitish hue from the semitransparent dead cuticle of the fruit, which is at this time unaffected by any fungus growth, being simply dead. Specimens of this disease have been submitted to more than one horticultural journal, and pronounced to be "sun-scalds." This, however, they cannot be, for the spots of disease are upon the crown of the fruit, which hangs downwards, so that any sun-scald would be upon the base of the fruit, which is uppermost. I have seen numerous specimens *in situ*, and can therefore speak positively upon this point, as it might be suggested that the primary lesion was due to a burn, and that the fungus afterwards attached itself to the injured spot. As the tomato ripens and assumes the beautiful red colour of maturity, the spot, which varies in size from 3 to 10 millimetres, acquires a jet-black colour. If a section be now made through it (fig. 3), it will be found that this blackness extends inwards towards the centre of the fruit, to a much greater extent than is apparent from the exterior. It is distinctly defined and harder than the parenchyma of the fruit. If a portion of this black substance be examined microscopically, it is found to consist of an assemblage of black mycelium compacted pretty closely together, having the appearance of the mycelium of the *Dematici* or black moulds. Upon the upper surface—the black spot—four fungi are found; one a true black mould, the other three polymorphic states of a *Phoma*. The black mould may be thus described.

Sporocybe lycopersici, n. sp. (fig 4).—Tufts olive-green, flocci erect, twice or thrice septate, about 5 mk. in diameter. Heads terminal globose, 20—30 mk. across. Spores numerous, subglobose or ovate, black, 3 mk. long.

The *Phoma* is preceded by conidia and macro-conidia.

CONIDIA: *Cladosporium lycopersici* (fig. 5).—Hypha tufted, septate, irregular in outline at their apices, springing by their bases from a black spot; compacted mycelium, spores abundant, cylindrical, black, 1—3 septate, slightly pointed at their extremities: 10—30 mk. long, by 8—10 mk. wide.

MACRO-CONIDIA: *Macrosporium lycopersici* (fig. 6).—Flocci, well developed, black, sep

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tate, somewhat flexuous, producing abundantly sooty-black irregular pyriform or sub-quadrate muri-form spores, which vary in size from 20—70 mk. long, by 10—20 mk. wide.*

STYLOSPORES: *Phoma destructiva* (fig. 7.)—Perithecia carbonaceous, minute, globose, spherical, clustered; spores, hyaline, oval cylindrical, binucleate, 5—6 mk. long, by 1.5—1 mk. wide.

Another disease which sometimes but much more rarely attacks tomatos while still growing, is due to a *Dactylium* very closely allied to, if not identical with *D. roseum*, B., from which it differs in producing its spores in threes, and in growing parasitically upon a living plant. This disease seems more especially to affect a variety of tomato known to gardeners as the Trophy, and commences upon the base of fruit, near the attachment of the stalk.

Dactylium lycopersici (fig. 8).—Forming a dense floccose whitish-pink mass. Spores hyaline, with a tinge of pink, oval or ovato-pyriform, uniseptate, often apiculate, produced in threes upon the terminal extremities of erect sparsely septate hyaline hyphæ.

My best thanks are due to Mr. S. Castle, of The Vineyard, West Lynn, for pointing out these different diseases, and supplying me with abundant specimens and much valuable information which has been inserted in this paper.—From the *Gardeners' Chronicle*, Nov. 12, 1881, p. 620.

ON THE RELATIONSHIP OF ÆCIDIUM BERBERIDIS *(Pers.)* TO PUCCINIA GRAMINIS *(Pers.)*.

By Mr. CHARLES B. PLOWRIGHT, M.R.C.S.

THERE are not many more important questions in the whole range of vegetable physiology than those connected with the entwickelungsgesschichte of the fungus which causes the mildew in wheat. The magnitude of the issues at stake have been forcibly brought before us, who reside in the large corn-growing country of Norfolk, during the last few weeks, where acres of wheat which, within a month or three weeks of the harvest, gave promise of an abundant yield, were in less than a fortnight blighted to such an extent that in some instances considerably less than half a crop only was produced.

In the month of May of the present year (1881), I performed some experiments with the view of convincing myself one way or the other upon the connection said to exist between *Æcidium berberidis* and *Puccinia graminis;* but owing to my non-acquaintance with the proper method of performing them, they resulted in failure. I then wrote to my esteemed friend, M. Max. Cornu, who immediately, in the most kind manner, gave me full and explicit directions as to the proper mode of procedure. On the 18th June I commenced a second series of experiments, which have been continuously carried on until the end of September, in which 176 plants of wheat have been employed. I propose laying before you a detailed account of each experiment, in order that you may be enabled to form

* This is probably the species of Macrosporium, found, and I believe published, by Ravenel, from the Southern States of America, under the name of M. tomati.

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your own opinion as to their results. But before doing this, I may be allowed to say that they were commenced and conducted, as far as it is possible to do so in such cases, with my mind unbiassed one way or the other, either for or against the theory of heterœcism. For upon the one hand I had a feeling that this theory was, to say the least, very remarkable; while upon the other, there was the fact of its acceptance, almost without question, by the majority of Continental mycologists, by men whose acumen is undoubted, and who justly rank in the fore-front of scientific botany. My mind was in a state of "expectant attention," but I had no other feeling in the matter, having never committed myself to an opinion either *pro.* or *con.*

Before detailing these experiments, there are some circumstances that have certain weight, both for and against, which should be fairly stated, in order that a more just opinion may be formed than would otherwise be the case. In the first place, it may be thought that the connection, as different states of the same fungus, between an *Æcidium* and a *Puccinia* is too wonderful to be true. We may readily enough accept the numerous other instances of polymorphism afforded by the fungus kingdom, and yet be unable to credit that a parasitic fungus can commence its life on one plant and finish it upon another, especially when the host plants are so far removed from one another, that the one is an exogen and the other an endogen. But this alternation of generation is well known to exist in other departments of the organic world, amongst organisms far higher in the animate scale than cryptogams. To take a well-known example afforded by the *Entozoa*, the *Tenia mediocanellata* (Küch.) commences its existence in the flesh of the ox, as *Cysticercus bovis*, and finishes it in the alimentary canal of man; or *Tenia solium* (Linn.) which commences its existence as *Cysticercus cellulosæ* in the flesh of the pig, and finishes it in the same situation as the first-mentioned cestode.

There exists a widely spread superstition amongst agriculturists, which was credited far more extensively by the past generation of farmers than it is now, that the presence of a barberry bush was connected with the occurrence of mildew in wheat. So much was this the case, that in most parts of Norfolk the barberry *(Berberis vulgaris)* has, to a great extent, been exterminated. Now nothing tends more to render a statement incredulous to people in general, and to scientific minds in particular, than to brand it with the title of superstition. We dislike above all things to be thought superstitious, it is derogatory to our intellectual status. Without entering upon the question generally, of whether most superstitions have not a strain, however meagre, of truth underlying them, this sentiment has not been without considerable influence in rendering us chary of accepting the heterœcism of *Puccinia graminis.* It must, however, be borne in mind, that the connection of barberry bushes with mildewed wheat, presumably arose as a matter of observation on the part of our forefathers, when they suffered from the pest.

Leaving these subsidiary considerations, and for the moment discarding the element of heterœcism, let us consider whether there be any impossibility in the *Æcidia* generally being the earlier states of certain *Pucciniæ.* It is presumed that

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no one now doubts the connection of the majority of *Uredines* with *Pucciniæ*, and it must be borne in mind that a much greater difference existed in form, colour, and spore structure, between *Puccinia* and *Uredo*, than is the case with *Æcidium* and *Uredo*. The free spores of many species of *Æcidium* cannot be distinguished from the spores of many *Uredines*. *Æcidium*, as a genus, differs from *Uredo* principally in the possession of spermogonia, of a peridium, but more particularly in producing its spores in chaplets. All *Æcidia*, however, do not possess spermatia, for of the thirty-two species enumerated as British in the "Handbook," the presence of spermogonia is only noted in four; while certain *Uredines* are provided with them, *e.g.*, *U. suaveolens*, Pers., *U. orchidis*, Mart., *U. gyrosa*, Rebent, *U. mercurialis*, Link., *U. Euonymi*, Mart., and *U. pinguis*, D.C.*

Sir John Lubbock, in his address to the British Association at York, last August, has very pertinently said, "Naturalists are now generally agreed that embryological characters are of high value in classification," the truth of which assertion is daily becoming more and more accepted by students of Natural History.

Now when we cause the spores of *Æcidia* to germinate under circumstances in which we can watch the process, we find they do so in exactly the same manner as *Uredo* spores, namely, by the protrusion of a hyaline tube through the epispore. This hyaline tube gradually elongates, and into it are emptied the contents of the spore, which are passed onwards until they eventually reach the end of the tube. This tube (or tubes, for there may be more than one,) undergoes in both instances the same spiral movements, and, unlike the tube produced by the germinating *Puccinia* spore, it does not, as a rule, produce secondary spores.

The association of *Æcidium* with *Uredo* (in some state or other, either as *Uredo*, *Puccinia*, *Uromyces*, or *Coleosporium*) upon the same plant, often upon the same individual, and even upon the same leaf, is a fact well known to practical mycologists.

Of the thirty-two species of *Æcidium* enumerated in Cooke's *Handbook of British Fungi*, this association exists in twenty species. In some cases we find in nature this exists very closely, *e.g.*, *Æc. ranunculacearum*, D.C., and *Uromyces ficariæ*, Lev., *Æc. epilobii*, D.C., and *Puc. epilobii*, D.C. *Æc. compositarum*, Mart., and *Puc. compositarum*, Sch., are often found upon the same leaf; while *Puc. sparsa*, Cooke, is expressly said by Dr. Cooke to be "only found amongst or near the exolete pustules of *Æcidium Tragopogonis*, Pers.†

There is, however, a much wider question broached when we come to associate the *Æcidium*, known only to exist upon an exogenous plant with a *Puccinia* confined to endogenous plants. In order to convince reasonable minds, the evidence must be unimpeachable and complete. No mere coincidences, however numerous, can *per se* be taken as conclusive. It was in the hope that reliable evidence one way or the other could be obtained, that the following series of experiments have been, during the past five months, carried on, and which I now venture to place before you :—

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* Tulasne—"*Second Mémoire sur les Médinées et les Ustilaginées.*" "*Ann. des Sciences Nat,*" 4 series, vol. ii., p. 116.

† Cooke—*Handbook of British Fungi*, p. 498.

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EXPERIMENT I.—On 18th June, 1881, seven healthy young wheat plants, about six inches in height, were infected with the spores of *Æcidium berberidis*, which were mixed with water, and freely applied to both surfaces of the leaves, and particularly to the angle which the blade forms with the stem. The pots containing the infected plants were covered by a large bell glass, and plunged, with great care, into the ground. At the same time 18 precisely similar wheat plants, grown from the same seed, were placed in the ground in a pot, and covered by a bell glass, to be kept as check plants. The *Æcidium* was obtained from North Wootton, distanced 3½ miles, and the spores were used for inoculation within two hours from the time they were gathered. A number of them were at the same time placed upon a drop of water on a glass slide, and kept in a damp atmosphere for 48 hours, when they were found to have germinated freely, which was proof positive of their vitality, and that they had not been injured by removal. Both groups of plants were watered from time to time, which was done by raising the edge of the bell glass covering them, an inch or two. At the end of 10 days the bell glasses were removed, and the plants examined daily. On the 25th day a single spot of *Uredo* was observed upon one of the infected plants; the others all remaining free. On the 30th day this leaf was removed and examined, and found to be veritable *Uredo linearis*. On the 32nd day two more of the infected plants had *Uredo* upon them, but it was now found upon the check plants: that is, in 22 days from the time they were uncovered. On the 43rd day the experiment was concluded, when the whole of the seven infected plants had *Uredo* upon them, as well as 16 out of the 18 check plants.

EXPERIMENT II.—On the 2nd July, three wheat plants, about the same size as those used in the previous experiment, were infected with the spores of *Æcidium berberidis*, obtained from the same source, under similar conditions to those of the former experiment. Three similar wheat plants, grown from the same seed, were kept as a check experiment. Both groups of plants were covered by bell glasses. The vitality of the *Æcidium* spores was proved by their germinating freely in 20 hours. On the 10th day the bell glasses were removed. On the 15th day a yellow spot was seen upon one of the infected plants; and on the 17th day all the infected plants had undoubted *Uredo* upon them; the check plants remaining healthy. On the 23rd day the experiment was concluded, and the whole of the plants taken up. All three infected plants had abundant *Uredo* upon them; but the check plants remained free from it.

EXPERIMENT III.—On the 5th July, two plants of wheat were infected with *Æcidium* spores from the same source, and three plants kept as checks; both were covered by bell glasses. The infected plants were, however, kept covered a few days longer than the check plants. The *Æcidium* spores germinated freely in 22 hours. On the 13th day *Uredo* appeared upon one of the check plants, and on the 14th day upon another; the infected plants remaining healthy. The experiment was terminated on the 31st day, when both check and infected plants were found to have *Uredo* upon them.

EXPERIMENT IV.—On the 9th July, one wheat plant was infected with *Æcidium* spores from the same source, and a similar wheat plant kept as a check

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The experiment was conducted in the same manner as the others. The germination of the *Æcidium* spores was tested by placing some upon a glass slide in a drop of water, and keeping them in a damp atmosphere. They did not germinate for 48 hours, and then only very feebly. I noted at the time: "Very faint attempts at germination have taken place; the contents of the slide were placed at 10 a.m. to-day (July 11) on the leaves of the infected plant. I think this experiment must fail, so weakly have the spores germinated." Notwithstanding this, however, by the 26th day both the infected and the check plants had *Uredo* upon them.

The hope of demonstrating unequivocally the truth of the heterœcism of *Puccinia graminis* had by this time become so seriously imperilled, that I determined upon varying my method of procedure. One hardly ever sees every individual plant in a state of nature, infected with the same parasitic fungus, and it occurred to me that by keeping my check plants covered by bell glasses they were debilitated, and so rendered unduly liable to be attacked by the *Uredo*. I therefore determined to grow my check plants naturally, and only to cover my infected plants for as short a time as was compatible with the period necessary for free germination to take place in the *Æcidium* spores; after they had been placed upon the leaves. My supply of *Æcidium berberidis* now failed, and I had to procure the fresh spores from Narborough, distanced about nine miles by rail, where several barberry bushes grew about a mile from the station.

Experiment V.—On the 26th July, ten wheat plants were infected with *Æcidium berberidis* spores from Narborough, and ten similar wheat plants, grown from the same seed, selected as check plants. These latter were never at any time covered by any bell glass, and were planted about six inches apart, some 30 yards from where my other experiments had been performed. On the 16th day three of the infected plants had *Uredo* upon them; on the 25th day the experiment was concluded. Five of the infected plants had *Uredo* on them, and nine of the checks.

Experiment VI.—On the 26th July, seven wheat plants (two of which were only half an inch high, with unexpanded leaves) were inoculated with *Æcidium* spores from Narborough, and seven wheat plants selected for check plants, which were never covered. The *Æcidium* spores germinated freely upon a glass slide. On the 17th day *Uredo* appeared on the five oldest of the infected plants. On the 24th day the experiment was concluded. There were then five infected plants with *Uredo* upon them (the two youngest having escaped), and seven check plants with *Uredo* upon them.

Experiment VII.—On the 29th July, five wheat plants were inoculated with *Æcidium* spores from Flitcham (distanced eight miles), and a similar number of check plants selected. On the 12th day *Uredo* was observed on the five infected plants, and upon two, possibly upon three, of the checks.

Experiment VIII.—On the 29th July, four wheat plants were infected with *Æcidium* from Flitcham, and a like number of check plants selected. On the 9th day all the infected plants had *Uredo* on them, as had three of the check plants.

Experiment IX.—On the 1st August, four plants were infected with *Æcidium*

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from Narborough, and four plants selected as checks. On the 22nd day three of the infected plants and three of the check plants had *Uredo* upon them.

I now determined upon asking my friends to grow the check plants for me, as I came to the conclusion that my garden was saturated with the spores of *Uredo linearis*.

EXPERIMENT X.—On the 19th July, some foreign wheat was planted, and a portion of the same wheat seed sent to Mr. Phillips, at Shrewsbury, with the request that he would plant it in his garden, and in due time select six check plants to be kept against six which I would inoculate in Kings Lynn. This Mr. Phillips kindly consented to do, and upon the 1st August I duly inoculated my six plants with spores of *Æcidium berberidis* from Narborough. I kept my plants almost continuously covered until the end of the experiment. On the 7th day *Uredo* appeared upon two of my infected plants; on the 8th day upon three more. As soon as I observed my plants had developed the *Uredo*, I pulled up each affected plant so that it might not infect the others. On the 15th day Mr. Phillips wrote me word that all his six plants were attacked by *Uredo*. I had still one of my infected plants which remained healthy; this, however, on the 19th day developed the *Uredo* and the experiment was terminated.

EXPERIMENT XI.—A sample of wheat was divided between my friend, the Rev. J. M. Du Port, of Mattishall, near East Durham, and myself, and the experiment conducted in the same manner as the preceding, excepting that Mr. Du Port sowed his wheat in two patches, Nos. 1 and 2, in two different parts of his garden. Patch No. 2 being sown three days later than No. 1, there being eight plants in each patch. On the 8th August I infected eight plants with *Æcidium* from Narborough, which were covered by a bell glass for 12 days. It was then removed for 48 hours and replaced on the 14th day. On the 15th day three of my infected plants had *Uredo* upon them, on the 25th day one more, on the 28th day two more, on the 31st day one more. At this time the experiment ended, and Mr. Du Port reported that patch No. 1 had three plants in it with *Uredo* upon them, but that patch No. 2 had not a single sound plant in it.

EXPERIMENT XII.—Fifteen wheat plants grown in my garden from one of the best samples of last year's wheat that had been offered in the Lynn Market, were on the 11th August infected with *Æcidium* from Narborough. I purposely kept this *Æcidium* 62 hours in a damp atmosphere in my study, and used the water upon which the spores had abundantly fallen, as well as the spores themselves, for infecting the wheat plants. On the 17th day three plants developed *Uredo*, on the 20th day six more, on the 22nd day one more, on the 23rd day two more, making a total of 12 infected plants out of 15, which developed the *Uredo* in the course of 23 days. Of the 15 check plants seven only were diseased.

EXPERIMENT XIII.—The thirteenth and final experiment was conducted upon a totally different principle. The wheat seed was poisoned by steeping it in a solution of cupric sulphate: and the ground in which it was planted was watered with a solution of carbolic acid in water. Two bell glasses thoroughly disinfected with carbolic acid and the copper solution were placed over both the patch to be used as check plants, and over the pots containing plants to be affected. These bell

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glasses were never touched until the plants were large enough to infect. On the 20th August six were inoculated with *Æcidium* spores from Narborough. A few days later, purposely choosing a day when there was no wind, the check plants were reduced to six. The bell glasses were not again removed until the 20th day, when both patches were rapidly but thoroughly examined and found free from *Uredo*. The glasses were replaced, and the plants re-examined on the 30th day. These were then finally removed and the plants thoroughly examined, but no trace of *Uredo* found upon either the infected nor upon the check plants.

The result of these 13 experiments may be thus summarised :—

Seventy-eight wheat plants were infected with the spores of *Æcidium berberidis* and 98 similar wheat plants kept as check plants against them. Of the infected plants 76 per cent. developed *Uredo* in an average of 24·4 days. While in the same period 70 per cent. of the uninfected plants became spontaneously attacked by *Uredo*. One experiment only (No. 2) out of the 13 was wholly in favour of the theory, and that lasted only 23 days. Still six per cent. more of the infected plants took the *Uredo* than of the uninfected. This is a very small portion, far too small in my humble opinion to constitute convincing evidence. I believe, however, that it can be accounted for by my own negligence in not thoroughly cleaning the bell glasses before using them to cover fresh plants. Had the last experiment (No. 13), however, proved favourable to the theory I should have regarded it as being much more worthy of acceptation than I can now do. It is only after much patient work and careful consideration that I felt myself bound to differ from the eminent botanists abroad who do accept the heterœcism of *Puccinia graminis* as established beyond question.

There are two other experiments not included in the above thirteen which were performed by me, that I think worthy of notice.

Experiment No. 36.—On the 2nd August, one oat plant, with 10 leaves upon it, was inoculated with *Æcidium berberidis* spores. A very large quantity of ripe *Æcidium* spores was used—on the 15th day *Uredo* appeared upon the oat plant. On the 9th September (38th day) these *Uredo* spores were examined and found to be the *Uredo* of *Puccinia coronata* Corda. Now had this experiment been carelessly performed the inference would have been that the *Æcidium* spores had produced the *Uredo* of *P. graminis*.

Experiment No. 40.—Six wheat plants were infected with the spores of *Uredo linearis* at 4 p.m. on the 13th August. On the 24th they all were simultaneously affected with *Uredo*, showing that the *Uredo* had reproduced itself in 11 days.

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TABLE OF EXPERIMENTS.

Number of Experiment	Date	Number of Plants infected	Number of Check Plants	Day on which *Uredo* first appeared upon infected plants	Total duration of experiment in days	Number of infected plants with *Uredo* when the experiment was concluded	Number of Check Plants with *Uredo* when the experiment was concluded	REMARKS.
I.	18 June	7	18	25	43	7	16	Check plants covered for about 8-10 days
II.	2 July	3	3	17	23	3	0	,,
III.	5 July	2	3	13	31	2	3	,,
IV.	9 July	1	1	26	26	1	1	,,
V.	26 July	10	10	16	25	5	9	Check plants never covered
VI.	26 July	7	7	17	24	5	7	
VII.	29 July	5	5	12	12	5	3	
VIII.	29 July	4	4	9	9	4	3	
IX.	1 Aug.	4	4	22	22	3	3	
X.	1 Aug.	6	6	7	19	6	6	Mr. Phillips kept Check plants
XI.	8 Aug.	8	16	15	31	7	11	Rev. J. M. Du Port kept Check plants
XII.	11 Aug.	15	15	17	23	12	7	
XIII.	20 Aug.	6	6	—	30	0	0	Protected throughout from accidental infection
	Total	78	98	Average 15·1 days	Average 24·4 days	Average 76 per cent.	Average 70 per cent.	

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[By the courtesy of the author, and of the proprietor of *The Gardeners' Chronicle*, we are enabled to introduce here the following results of further researches upon this subject by Mr. PLOWRIGHT in the year 1882.]

THE CONNECTION OF WHEAT MILDEW (*Puccinia Graminis, Pers.*), WITH THE BARBERRY ÆCIDIUM (*Æ. Berberidis, Gmel.*).

By Mr. C. B. PLOWRIGHT, M.R.C.S.

[Contributed in 1882.]

ON THE CONNECTION OF THE WHEAT MILDEW WITH THE BARBERRY.

HAS the barberry really anything to do with the mildew in wheat? This question is one of great practical importance to the agriculturist, and through him to all classes of the community. It is by no means a novel one, and cannot be shelved as a new-fangled notion too crude to be worth investigation; for it is just a century ago, this present year, that the first recorded experiment bearing upon the question was performed, in the same county in which these lines are penned. Seventeen years ago the connection was proved to the satisfaction of Continental botanists, but many of us in this country and in America either denied it altogether or accepted it in a half-hearted sort of way. The magnitude of the interest at stake, as well as the great importance of the subject from a scientific point of view, demand that we should take the trouble to decide one way or the other. If the experiments upon which the assertion of this connection is based will not bear repeating, let us cast the vaunted theory to the winds and have done with it. But if, upon the other hand, these experiments prove the connection, let us accept it although it does uproot our prejudices and entails the acceptance of a great deal which, at present, we regard as too wonderful to be true, for *Puccinia graminis* is by no means the only case of the kind.

It was in the hope of being able to arrive at a definite conclusion one way or the other, that the writer, in the summer of 1881, performed a series of experiments* by infecting a number of wheat plants with ripe spores of the barberry fungus, with this result, that while 76 per cent. of the infected plants took the disease, no less that 70 per cent. of similar wheat plants, which were kept as check plants, became spontaneously affected with mildew. The natural conclusion arrived at was, that 6 per cent was not conclusive evidence. It is obvious that mildew is a highly infectious disease, and the necessity for a less rough method of experiment is demanded if unequivocal results are to be obtained.

In the spring of this year (1882) another series of experiments was instituted, in which not only was the barberry fungus sown upon wheat, under circumstances

* Plowright, *Grevillea*, vol. x., p. 33—41.

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which should, as far as possible, preclude the agency of accidental infection, but conversely the wheat mildew was sown upon barberry plants—with the result, it may be premised, of once again demonstrating that the barberry fungus and the wheat mildew are two states of one and the same fungus. Lest it should be thought I have jumped too eagerly to this conclusion it may here be said that when I began these experiments this year it was with a mind biased against the theory of "heterœcism" (that is, the occurrence of the same fungus in different phases of its growth on totally different plants), that the experiments now amount to more than a hundred, and that they have embraced many other species of *Uredines* besides the one which forms the subject of this paper. Had we given our forefathers more credit for the faculty of observation it would not have taken us a hundred years to arrive at our present position; nor will the time be wasted if we glance in detail at some of their writings on this subject.

History of the Subject.

The mildew of wheat has, as a blight, probably been known from remote antiquity. The Romans held a festival on April 25th—the Robigalia, or Rubigalia—with the object of protecting their fields from mildew. The sacrifices offered on this occasion consisted of the entrails of a dog and a sheep, accompanied with frankincense and wine.* The fungoid nature of the mildew was not known until the latter half of the last century, for Tull,† writing in 1733, attributes it to the attacks of small insects "brought (some think) by the east wind," which feed upon the wheat, leaving their excreta as black spots upon the straw, "as is shown by the microscope!" Felice Fontana,‡ some thirty years later, published an account of the fungus, with figures. Persoon,§ in 1797, gave it the name it still bears *(Puccinia graminis)*, and also figured it, as did Sowerby,‖ in 1799, under the name of *Uredo frumenti*.

The first mention of the subject immediately under consideration is by Marshall,¶ who, writing in 1781, says:—

"It has long been considered as one of the first or vulgar errors among husbandmen that the barberry plant has a pernicious quality (or rather a mysterious power) of blighting the wheat which grows near it.

"This idea, whether it be erroneous or founded on fact, is nowhere more strongly rooted than among the Norfolk farmers; one of them mentioning, with a a serious countenance, an instance of this malady I very fashionably laughed at him. He, however, stood firm, and persisted in his being in the right, intimating that, so far from being led from the cause to the effect, he was, in the reverse, led from the effect to the cause; for, observing a stripe of blasted wheat across his close, he traced it back to the hedge, thinking there to have found the enemy; but being disappointed, he crossed the lane into a garden on the opposite side of it, where he found a large barberry bush in the direction in which he had looked for it. The mischief, according to his description, stretched away from this point across the field of wheat, growing broader and fainter (like the tail of a comet) the farther it proceeded from its source. The effect was carried to a greater distance than he had ever observed it before, owing, as he believed, to an opening in the orchard behind it to the south-west, forming a gut or channel for the wind.

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"Being desirous of ascertaining the fact, be it what it may, I have enquired further among

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* Smith, *Smaller Dictionary Greek and Roman Antiquities*, 5th edit., 1863, p. 322.
† Jethro Tull, *Horse Howeing Husbandry*, 3rd edit., 1751, p. 151–2.
‡ Felice Fontana, *Osservazioni sopra la Ruggine del Grano*, Lucca, 1767.
§ Persoon, *Tentamen Dispos. Method. Fungorum*, 1797, p. 39, t. iii., f. 3.
‖ Sowerby, *English Fungi*, vol. ii., 1799, t. 140.
¶ Marshall, *Rural Economy of Norfolk*, 2nd edit., London, 1795, vol. ii., p. 19.

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intelligent farmers concerning the subject. They are, to a man, decided in their opinion as to the fact, which appears to have been long established in the minds of the principal farmers, that it is now difficult to ascertain it from observation, barberry plants having (of late years more particularly) been extirpated from farm hedges with the utmost care and assiduity; one instance, however, of mischief this year I had related to me; and another I was myself eye-witness to. Mr. William Barnard, of Bradfield, says that this year, seeing a patch of his wheat very blighted, he looked round for a barberry bush, but seeing none conspicuous in the hedge, which was thick, he, with some difficulty, got into it, and there found the enemy. He is clearly decided as to the fact. Mr. William Gibbs, of Rowton, telling me that a patch of his wheat was blighted in the same manner, and that he believed it to proceed from some sprigs of barberry which remained in the neighbouring hedge (which a few years ago was weeded from it), I went to inspect the place, and true it is that near it we found three small plants of barberry, one of which was particularly full of berries. The straw of the wheat is black, and the grain, if it may be so called, a mere husk of bran, while the rest of the piece is of a much superior quality.

"These circumstances are undoubtedly strong evidence, but do not by any means amount to proof."

On October 16, 1782, Marshall * writes :—

"To endeavour to ascertain the truth of this opinion I had a small bush of the Barberry plant set in February or March last, in the middle of a large piece of wheat.

"I neglected to make any observations upon it until a little before harvest, when a neighbour, (Mr. John Baker, of Southrepps,) came to tell me of the effect it had produced.

"The wheat was then changing, and the rest of the piece (about 20 acres) had acquired a considerable degree of whiteness (white wheat): while about the barberry bush there appeared a long but somewhat oval-shaped stripe of a dark livid colour, obvious to a person riding on the road at a considerable distance.

"The part affected resembled the tail of a comet, the bush itself representing the nucleus, on one side of which the sensible effect reached about 12 yards, the tail pointing towards the south-west, so that probably the effect took place during a north-east wind.

"At harvest, the ears near the bush stood erect, handling soft and chaffy; the grains slender, shrivelled, and light. As the distance from the bush increased the effect was less discernible, until it vanished imperceptibly.

"The rest of the piece was tolerable crop, and the straw clean, except on a part which was lodged, where the straw nearly resembled that round the barberry, but the grain on that part, though lodged, was much heavier than it was on this, where the crop stood erect.

"The grain of the crop, in general, was thin-bodied; nevertheless, ten grains, chosen impartially out of the ordinary corn of the piece, took twenty-four of the barberried grains, chosen equally impartially, to balance them."

In 1784, Marshall repeated his experiment at Statfold, in Staffordshire, with the same result. He says†—"Upon the whole, although I have not from this year's experience been able to form any probable conjecture as to the cause of the injury, it nevertheless serves to fix me still more firmly in my opinion that the barberry is injurious to wheat."

Withering, writing in 1787 of *Berberis vulgaris*, says‡—"This shrub should never be permitted to grow in corn lands, for the ears of wheat near it never fill, and its influence in this respect has been known to extend as far as 300 or 400 yards across a field."

In 1804 this country suffered severely from an outbreak of wheat mildew, in consequence of which Mr. Arthur Young, the Secretary to the Board of Agriculture, issued a circular of questions, so as to obtain a consensus of opinion, from farmers, landowners, and others, interested in the subject, as to various points connected with causation of mildew. The ninth question ran thus,—"Have you made any observation on the barberry as locally affecting wheat?" The replies

* Marshall, *loc. cit.*, p. 359.
† Marshall, *Rural Economy of the Midland Counties*, 1790, vol. ii., p. 11.
‡ Withering, *Botanical Arrangement*, 1787, edit. ii., p. 366.

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to these questions were published,* and from them the following evidence bearing upon the question we are considering are selected.

Isaac King, Esq., Wycombe, Bucks, in answer to the question about the barberry, says,—"In 1795, a field of about 20 acres had two large barberry bushes growing within 20 yards of it. These appeared to be the focus of destruction to several acres; in front, close to the hedge, the wheat was as black as ink, and further off it was affected to a less degree . . . In short, I had 15 acres very good, and 5 of very little value. You may conclude the barberries were destroyed."

Mr. S. Johnson,† Thurning, Norfolk, says,—"My observations on the barberry have been for several years. I have seen the blast from a small stem blown on the wheat in one direction upwards of 2 furlongs like smoke from a chimney."

Mr. W. Maxey,‡ Knotting, Bucks, says,—"When passing a wheat field a few years ago on the eve of harvest, I noticed some streaks of a different and darker hue across a furlong of wheat from the hedge directly opposite; at the end of each streak was a barberry bush."

Mr. James Sheppard,§ Chippendale, Newmarket, says,—"I have never seen an instance of wheat growing near a barberry not being injured more or less."

It is quite unnecessary to quote any further from Mr. Young's correspondents upon this point.

Sir Joseph Banks in his paper on "Wheat Mildew," alluding to the subject before us, mentions the belief as being prevalent amongst farmers, but scarcely credited by botanists, and points out the resemblance the yellow fungus on barberry has to rust, although it is larger. He says:—‖"Is it not more than possible that the parasitic fungus of the barberry and that of wheat are one and the same species, and that the seed is transferred from the barberry to the corn?"

This is precisely what Professor De Bary did sixty years afterwards, when he actually produced the wheat mildew from the barberry fungus. It must be remembered that, although these statements were made half a century ago, this in no way affects their veracity; but it may be well to quote a more recent instance in which the deleterious influence of the barberry is shown. M. Gabriel Rivet,¶ writing in 1869, alluded to the fact that the Paris and Lyons Railway Company planted a barberry hedge beside their line. The neighbouring proprietors drew up petitions, and asked the company to remove the hedge. The company made trials by cutting a part of it down to see if it were really as hurtful as was alleged, and found the mildew so much diminished thereby that they had the whole hedge removed.

On July 17th, 1882, I examined a field of wheat at Flitcham, Norfolk, in the hedge of which were three barberry bushes. Although they had been cut down a fortnight previously, there was no difficulty in finding the place where each had

* A. Young, *Annals of Agriculture*, vol. xliii., 1805, p. 457.
† *Loc. cit.*, p. 469.
‡ *Loc. cit.*, p. 505.
§ *Loc. cit.*, p. 510.
‖ Banks, in *Annals of Agriculture*, vol. xliii., p. 521.
¶ Rivet, in *Bulletin de la Société Botanique*, vol. xvi., p. 331—334. *Influence de plantations d'epine-vinette sur la developpement de la rouille des céréale.*

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been, from the extent to which the corn was destroyed by mildew in a semicircle, about ten yards in diameter, opposite each bush. The rest of the field was free from the disease. As a matter of fact the three barberry bushes, or rather the places where they had been, were found by looking for the mildewed places in the wheat. It was felt at the time that had any disbeliever in the heterœcism of the wheat mildew been present, he would have been then and there convinced by the logic of facts.

Life-history of the Fungus.

Since Persoon gave to the fungus which causes the wheat mildew the name of *Puccinia graminis*, in the year 1797, our knowledge of its life-history has progressively increased, owing to the researches of Tulasne and De Bary, who have shown, first, its connection with rust; then its mode of germination; and, lastly, its heterœcismal character. The genus *Puccinia* is purely a parasitic one. Up to the present time some eighty species have been met with in Great Britain. A perfect *Puccinia* has no less than five kinds of reproductive forms, to which the following names have been applied, viz.:—*Æcidium*, *Spermogonia*, *Uredo*, *Puccinia*, and *Promycelium*. Since these various forms of fructification constitute a cycle, it matters but little which we commence with, for if they be only taken consecutively, we shall come round to the one with which we started. Perhaps it will be most convenient to begin with the *Uredo*.

First Stage: Rust—or Uredo Spores (fig. 1).

Uredo linearis.—The well-known rust of wheat consists, as its names imply, of elongated masses of orange spores, which, during the summer months, occur abundantly upon the living leaves of various grasses and cereals. It is not confined to the leaves, for it frequently is found upon their sheaths, upon the stem, and also upon the glumes. If a speck of rust be examined through a common lens, it will be seen to consist of a mass of golden dust, around which can be seen the torn edges of the epidermis. This yellow powder consists of oval spores, measuring from 25 to 35 mk. long, by from 15 to 20 mk. wide. They are not uniform in shape, some being more globose than others, but they are all studded with minute protuberances, so as to present a warted appearance. They were originally formed beneath the cuticle of the plant, which, as they increased in size and number, they ruptured. When mature, these spores readily fall apart, and are scattered and carried away by the faintest breath of air. Examined more attentively, the majority will be found to possess, at one end, an appendage marking the point of their attachment to the leaf from which they sprang. If a young pustule of rust be examined in section, it will be found that each spore springs separately from a single transparent thread or tube, a portion of the mycelium or spawn of the fungus. This mycelium consists of an entanglement of hyaline tubes, ramifying between the cells of the plant that bears it; at certain points these accumulate together and give off a mass of branches parallel to each other, all pointing towards the cuticle of the leaf. These branches become enlarged at their superficial extremities, where, eventually, each one produces a single spore. These spores are at first like the mycelium—colourless, but soon become filled with yellow endo-

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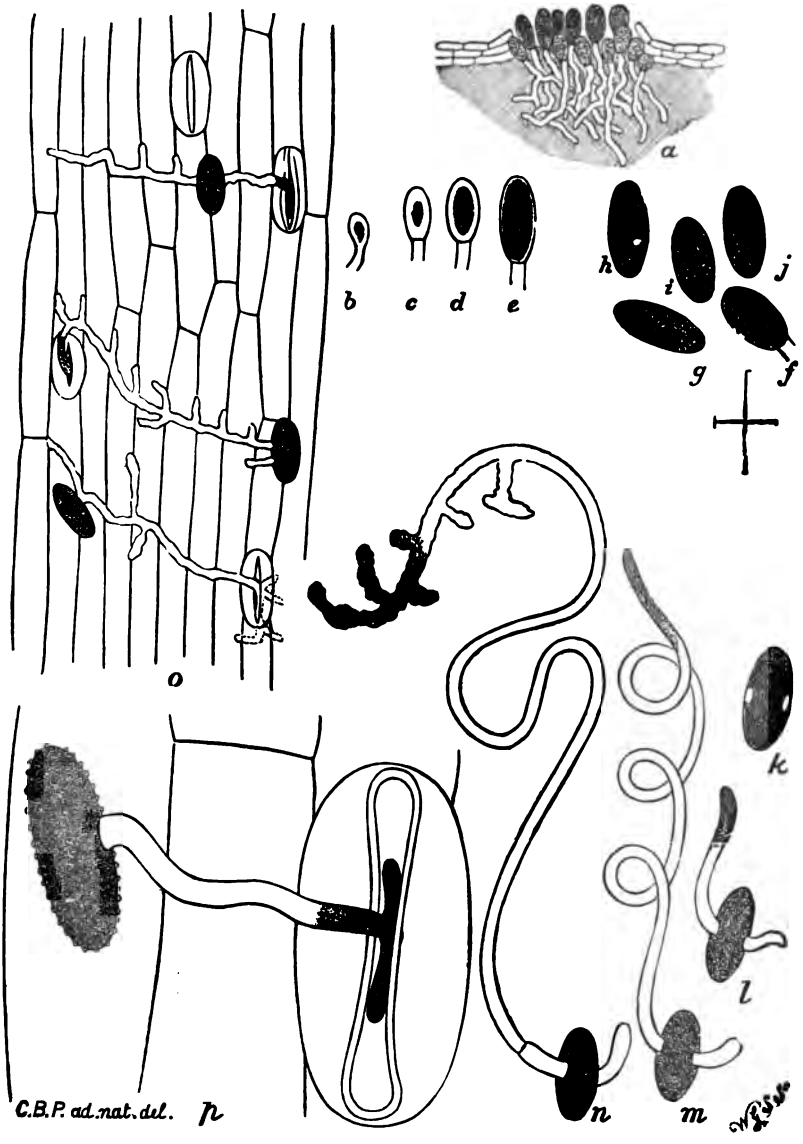

FIG 1.—UREDO LINEARIS.

a, cluster of Uredo-spores springing from mycelium in a Wheat-plant surrounded by the ruptured epidermis; *b*, *c*, *d*, *e*, *f*, *g*, *h*, *i*, Uredo-spores of various ages: *k*, Uredo-spore germinating in water,—the first change; *l*, *m*, *n*, further stages of germination in water as explained in the text; *o*, Three spores of Uredo germinating upon the cuticle of Wheat, the germ-tubes of which are entering the stomata, 8—10 hrs.; *p*, Germ-tube from a Uredo-spore squeezing itself into a stomate (7 hrs.).

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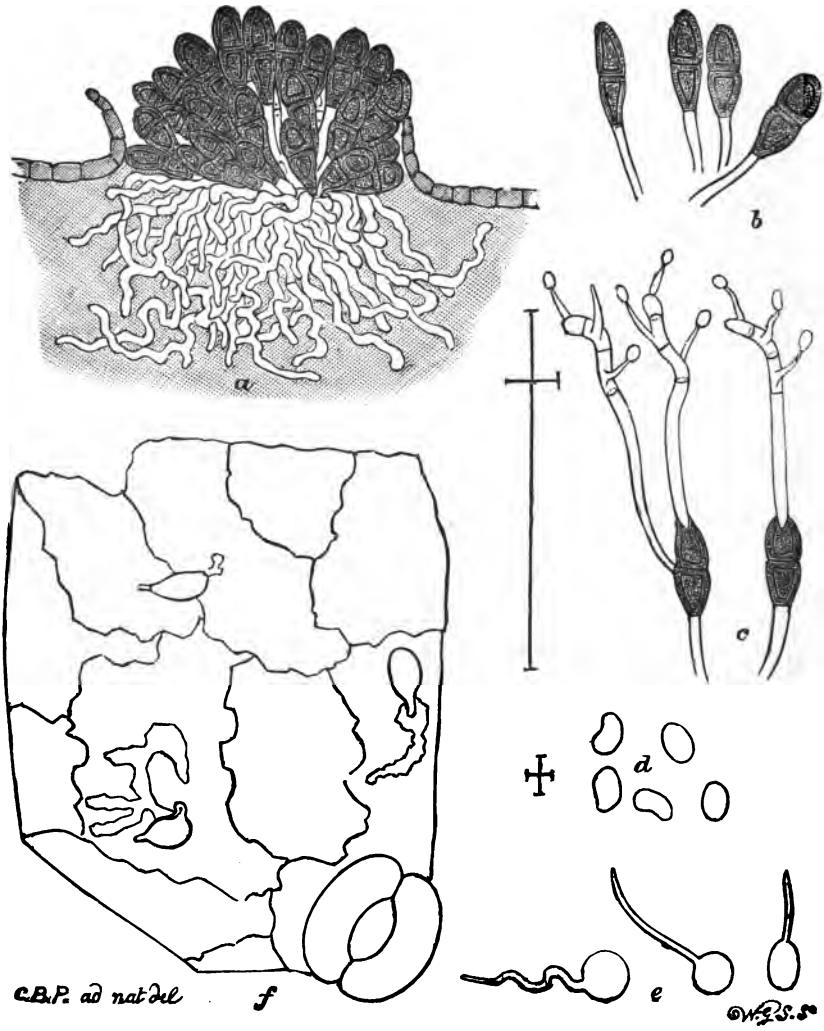

FIG. 2.—PUCCINIA GRAMINIS.

a, Mass of teleutospores springing from the mycelium and rupturing the epidermis; *b*, Four teleutospores; *c*, Germinating teleutospores bearing a promycelium and spores; *d*, Promycelium spores; *e*, Promycelium spores germinating in water; *f*, Three promycelium spores which have germinated upon the skin of a Barberry leaf. Their germ-tubes have bored their way through the epidermal cells, and have begun to form mycellum (24—48 hours).—After De Bary.

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chrome; they then by their combined pressure rupture the cuticle, and constitute the *Uredo* above mentioned.

If a few fresh ripe spores be placed upon a drop of water on a glass slide, and kept in a damp atmosphere, they will, in three or four hours, germinate. This process is very interesting, and can easily be watched by anyone who cares to take the trouble to do so. In from two to four hours, most of the spores will have protruded two germ tubes from the middle of their length. These tubes come through two circular openings in the thick wall of the spore; in from five to six hours, the germ-tubes will be twice or thrice the length of the spore, and in them will be seen yellow granules from the interior of the spore. As a rule, only one of these germ-tubes continues its growth, which it does so rapidly that in from twenty to twenty-four hours it has become many times the length of the spore. During this time nearly the whole of the yellow endochrome (contents of the cell) has passed from the interior of the spore, and from the abortive tube, to the extremity of the growing one. This tube has not only grown longer, but has taken a variable number of spiral twists like a corkscrew. It now, at the end farthest from the spore, gives off a number of irregular branches at a more or less rectangular direction. The lower end of the tube is now cut off by a septum from the empty spore-case.* If this germination has taken place upon the cuticle of the wheat plant (or any other grass upon which the *Uredo* is parasitic) one or more of the branches gains an entrance into the interior of the leaf through the stomata. Once inside the leaf, the mycelium is in its proper soil and luxuriates, as before said, by ramifying between the cells of the host-plant, and, in due course, produces Uredo-spores. But the host-plant does not live for ever; on the contrary, many of the grasses die down in winter, and although Uredo-spores have, under favourable circumstances, been known to retain their germinative power† for some time, yet they lose it if kept dry for one or two months at most. Probably in a state of nature they would germinate soon after they were ripe, and so become effete. How, then, is it that this rust re-appears year after year?

Second Stage: Resting-spore—Puccinia or Mildew (fig. 2).

Towards the end of summer, the mycelium, which has been continuously developing Uredo-spores, produces a resting-spore—or a body which has the faculty of lying dormant throughout the winter and germinating in spring. These resting-spores, or "teleutospores," constitute the *Puccinia graminis*, or wheat mildew proper. They are produced in a similar manner to the Uredo-spores, but are very different in structure. Each teleutospore is club-shaped, and divided transversely into two compartments by a septum. In colour, when seen by transmitted light, they are a rich clear brown, but appear almost black when viewed *en masse*. Inferiorly each spore has an elongated stem, by which it is permanently attached to the host-plant. They occur in elongated patches upon the straw, sometimes upon the glumes. Each patch is surrounded by the torn everted edges of the epi-

* For further account of the germination of this and other Uredines, see Plowright, *Grevillea*, vol. x., p. 138, pl. 159.

† De Bary, *Neue Untersuchungen über Uredineen*, 1865, p. 24.

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dermis, so that mildewed straw when drawn through the fingers feels rough. The teleutospores measure from 30 to 60 mk. in length, by from 10 to 20 mk. in breadth. Germination takes place only after a prolonged rest of some months, and consists in the protrusion of a germ-tube (the "promycelium" of De Bary) through an opening in the wall in each division of the teleutospore. These germ-tubes are of a definite length, straight below, usually curved towards the extremity, often like the hook of a walking-stick. The upper part of the germ-tube gives off three simple branches which taper from base to apex, where each bears a single oval or subreniform hyaline spore from 8 to 12 mk. by 5 to 8 mk. The end of the germ-tube is divided into three parts by septa, from each of these divisions a tapering spore-bearing branch arises. The spores, although hyaline, are faintly tinged of a pale yellowish hue. These spores, when placed in water, after a short time again germinate by sending out a slender germ-tube. Now it is upon the life-history of these spores, or promycelium spores, as they may for distinction's sake be called, that the main question we have under consideration hinges. If they be placed upon a barberry leaf, their slender germ-tubes bore right through the epidermis of the leaf into its interior, where they produce a mycelium, which, in the course of about eight days, manifests its presence by development of the first signs of the *Æcidium* or Cluster-cup. This is no mere figment of imagination, but a physiological fact that can be proved by any person so disposed.

Experiments with Promycelium Spores.

In the spring of this year (1882) Mr. James Bird, of Downham, kindly gave me six small barberry bushes *(Berberis vulgaris)*, about 10 inches high. On April 14th, April 17th, and May 9th, respectively, I infected one of these with spores from the promycelium of *Puccinia graminis* from wheat and twitch, and kept the remaining three barberries as control plants. In due course the *Æcidium* appeared upon the infected plants, the control plants remaining free from *Æcidium*, and they continued so for two months, when they were cut down, the experiment being then ended. If the promycelium spores, however, are placed upon the epidermis of a living wheat plant, contrary to what one would expect, they do not enter it. De Bary says,* "The sowing of the promycelium spores gave me, as they had previously done,† the unexpected result that the germ-tubes did not penetrate the epidermis of the mildew or teleutospore-bearing host-plant. Upon the various parts of *Triticum repens*, *T. vulgare*, and *Avena sativa*, they remained as if they had been sown upon a glass plate; the tubes turned irregularly in the most different directions and died off, the infected grass-plant remaining intact."

On April 15th and 17th, I placed upon nine wheat seedlings some of the same promycelium spores which were used for infecting the Barberries, and upon May 7th one of the wheat plants had rust or *Uredo* upon it. As these plants were, however, exposed to the air for fourteen days, an element of doubt is admitted, although an equal number of check plants grown in the open air, in the same garden, remained free from rust. That they did not contract the parasite from the

*De Bary, *loc. cit.*, pp. 24, 25. † De Bary, *Champ. Paras.*, p. 86.

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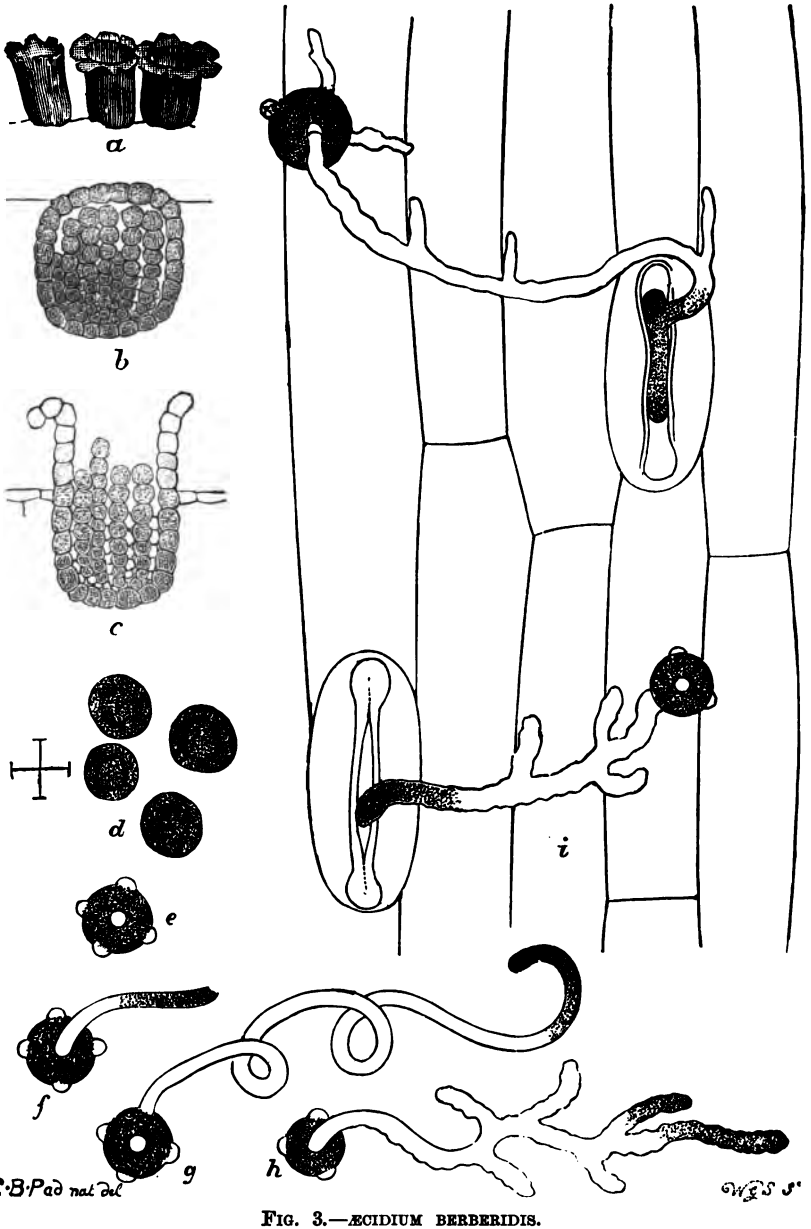

FIG. 3.—ÆCIDIUM BERBERIDIS.

a, Three cups; *b*, An immature cup before its upper wall has ruptured; *c*, Mature cup; *d*, Æcidium-spores; *e*, Æcidium-spore just beginning to germinate in water; *f*, *g*, Germination more advanced (in water); *h*, Æcidium-spore which has germinated upon the cuticle of a Wheat-plant; *i*, Cuticle of Wheat with two spores of Æcidium upon it, the germ-tubes of which are entering the stomata. (8 hrs.)

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Barberries in my garden is clear from the fact that there were no Æcidium-spores there until many days later.

THIRD STAGE: CLUSTER-CUPS—ÆCIDIUM (FIG. 3).

The *Æcidium berberidis*, which, under any circumstances, must be regarded as the result of the promycelium spores of *Puccinia graminis*, is a far more attractive fungus, from an æsthetic point of view, than either of the preceding forms; when seen by a low magnifying power, it is seen to consist of a beautiful cluster of minute cups filled with golden-yellow spores. These cups are formed of a membrane which forms a circle of whitish teeth round their mouths. They are always in groups and are cylindrical in form. The spores which fill them are subglobose, smooth, golden-yellow, and measure from 15 to 25 mk. in diameter. They, like the Uredo-spores, are developed from mycelium, but in quite a different manner; for, instead of being produced singly, they are formed in chains, one above another, from the bottom of the cup, the oldest and ripest spore being at the top. This, when mature, falls off, to be succeeded in the course of a few hours by the one next below it. If a leaf with the *Æcidium* upon it be put upon a glass slide, it, in the course of a few days, will deposit a mass of yellow dust. If a small quantity of this powder, which, of course, consists of spores that have been shed by the *Æcidium*, be placed on a drop of water, few, if any, of the spores will germinate, for the reason that they are immature and have fallen out of the cup because the plant has lost some of its moisture by evaporation. It is important to bear this in mind, as it is often the cause of failure in experimenting with the Uredines. The ripe Æcidium-spore germinates in the same manner as the Uredo-spore does. The germ-tube is protruded through one of the six openings which exist, at any rate potentially, in the epispore. The yellow endochrome is passed in the same way to the end of the convoluting branched germ-tube which is destined to enter the stomata of a graminaceous plant. If, however, the Æcidium-spores fall—as they, of course, constantly do—upon the Barberry leaves, they do not reproduce the *Æcidium berberidis*, for if their germination be watched upon the cuticle, it will be found that their germ-tubes do not enter the leaves. Hence they differ very considerably from the Uredo-spores, which, it will be remembered continuously reproduced themselves upon their host-plant. Neither will the germ-tubes of the Uredo-spores, if the latter be sown upon barberry leaves, enter them. Nor is the *Æcidium* ever produced from the Uredo-spores.

FOURTH FORM: SPERMOGONIA (FIG. 4).

Besides the Cluster-cups, there exists in company with the *Æcidium*, another important set of reproductive organs which are developed from the same mycelium and to which the name of *Spermogonia* has been applied. *Spermogonia* can be seen as minute dark specks upon the opposite side of the leaf, and immediately over the place occupied by the *Æcidium*. In point of time, they are the first organs produced by the mycelium of the promycelium spore, and they last as long as the *Æcidium* does. Sometimes they are produced alone, and are not accompanied by the *Æcidium*,* but this is an exceptional although not unique occurrence. Each

* Cooke, *Microscopic Fungi*, edit. 4, 1878, p. 29.

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spermogonium consists of a flask-shaped body, sunk in the substance of the leaf, formed of exceedingly delicate threads about half the diameter of those of the mycelium, and originating from them (De Bary). The mouth of the flask is conical, and, by pressure, is easily split from top to bottom into parallel fibres or elongated cells. The interior is filled with delicate threads which bear upon their ends chains of exceeding minute bodies, called *spermatia*. The spermatia vary a good deal in size and form, some are elongated, others nearly spherical; they measure from 2 to 3 mk. by .5 to 2 mk. Their function has not as yet been absolutely demonstrated, but there is little doubt that they play the part of the male element. If I am not greatly mistaken, they are the bodies one so constantly sees surrounding and adherent to the spores of many species of *Æcidium*.* The germination of ripe Æcidium-spores may be watched upon the cuticle of a wheat plant, and the way in which their germ-tubes squeeze into the stomata easily seen.

EXPERIMENTS WITH ÆCIDIUM-SPORES.

On May 23rd, I infected twenty wheat plants with ripe Æcidium-spores that had been sent me from Drayton Rectory. These wheat plants had been carefully protected from accidental infection by being continuously covered with a bell-glass from the day they were sown until the experiment was concluded. On June 4th, *Uredo* appeared upon ten of these plants. I then removed the plants to my study, where, day by day, the *Uredo* made its appearance upon fresh plants until the whole were affected. An equal number of wheat plants were kept as a control experiment; they were protected in the same way from accidental infection, and remained perfectly free from *Uredo* the whole time.

Concerning the barberry *Æcidium*, it only remains to add, that there are at least two other *Æcidia* upon various barberries that are in no way connected with *Puccinia graminis*. One of these has only been found in Chili, where Gay met with it some forty years ago. It is mentioned by Montagne† as occurring in company with a *Puccinia* on the leaves of *Berberis glauca*. De Bary‡ examined an original specimen of Montagne's plant, and found the spores to be twice the size of the *Puccinia graminis Æcidium*; and he also found the *Puccinia berberidis*, Mont., differed not only from *P. graminis*, but from all other European *Pucciniæ*.

In 1875, Dr. P. Magnus§ drew attention to the occurrence, in various parts of Europe, of an *Æcidium* upon barberry, which was originally described under the name of *Æ. magelhanicum* by Mr. Berkeley‖ from specimens collected by Captain King at Port Famine, in the Straits of Magellan, upon *Berberis ilicifolia*. It differs from the *Æcidium* of *Puccinia graminis* in appearing earlier in the year; in its cups being less elongated, and in their being scattered upon the under-side of the leaf; in the spores being larger; and in their germ-tubes not entering the leaves of grasses. It is probably identical with the *Æ. graveolens* collected by Shuttleworth, at Berne, in 1833, as mentioned by Dr. Cooke.¶

* Plowright, in *Grevillea*, vol. x., p. 140, t. 159, f. 2. 3.
† Montagne, *Sylloge*, p. 314, No. 1138.
‡ De Bary, *loc. cit.*, pp. 31, 32.
§ Magnus, *Hedwigia*, vol. xv., No. 1876, p. 2.
‖ Berkeley, in Hooker's *Flora Antarctica*, vol. ii., p. 450, pl. 163, fig. 2.
¶ Cooke, *Fungi, their Nature, &c.*, p. 203, f. 108.

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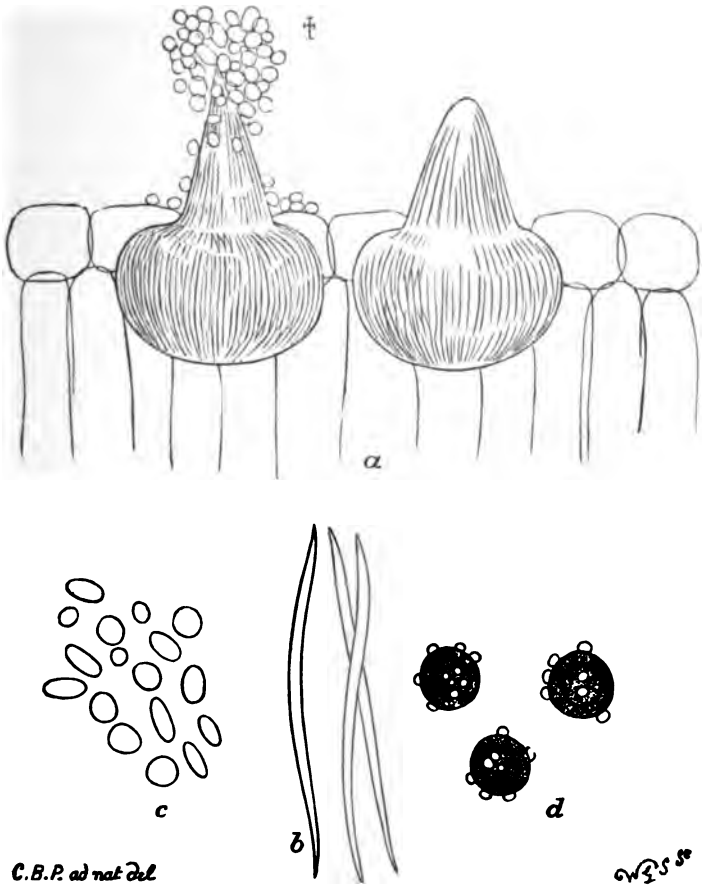

FIG. 4.—SPERMOGONIA OF ÆCIDIUM BERBERIDIS.

a, Two spermogonia upon the upper surface of a Barberry leaf; *b*, Fibres of which the mouth of the spermogonium is formed; *c*, Spermatia, very much enlarged; *d*, Æcidium-spores with spermatia (?) adhering to them.

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The foregoing account of *Puccinia graminis* includes the principal facts at present known concerning its structure and life-history. That one stage of its existence is passed as a parasite upon the barberry does not admit of doubt. But the question presents itself—is this an absolutely essential stage, or can the mildew be propagated without the intervention of the *Æcidium* state? The principal reason which suggests the question is the disproportion which exists in England between the amount of mildew aud the number of barberry bushes. Especially does this obtain in Norfolk, where this shrub has been, to a great extent, exterminated. It is a matter of common observation that stray wheat plants grown on a heap of farm-yard manure, are almost invariably attacked by mildew. This has been asserted to be due to over-nitrogenous stimulation, but no amount of nitrogen has ever yet produced a Uredo or any other spore. It is worth remembering that a wheat plant, so situate, must, during the spring, be surrounded by an atmosphere loaded with promycelium spores from the *Puccinia*, which is invariably formed upon straw, and it is only reasonable to suppose that these spores have a greater chance of infecting a plant than when in artificial culture a limited number is placed before the fragment of a leaf, and examined under the microscope.

But, assuming that De Bary is right in his view, that these promycelium-spores cannot enter the wheat plant, is there any way in which the *Uredo* can be produced other than by the implantation of Æcidium-spores? It is improbable that the mycelium is perennial, even when affecting perennial grasses.* During the winter months, in a not exceptionally severe winter, it is possible to find stray pustules of *Uredo* either upon wheat, or, more commonly, upon Twitch, growing in sheltered situations. Thus, last December (1881), I found a fresh pustule of *Uredo* upon Twitch *(T. repens)* in a wood, and also one in the month of March on a hedge-bank at Flitcham. This spring, our Norfolk and Suffolk wheats were much affected with rust; some of this may be, and probably was, due to *Uredo linearis*, kept alive from the previous autumn, but the bulk of it was due to the *Uredo* of *Puccinia straminis*, which is always an earlier *Uredo* than that of *P. graminis*.

There is a wonderful difference in the amount of injury done by mildew, when derived directly from the barberry, and when derived from *Uredo* that has reproduced itself through several generations. This is very obvious from the fact that the *Uredo* is to be found every year in almost every—if not in every—cornfield, but the farmer takes no notice of it, as it does not appreciably diminish the yield. But with the mildew which occurs in the middle of the barberry bush the case is different. The fungus grows with such energy that it so injures the wheat plant as to prevent it producing more than a few starved kernels. With such vigour does the mycelium grow and fructify at the expense of the wheat, that the straw of the latter frequently does not ripen, but dies green. This is only what one would expect when the fact is taken into consideration, that the Æcidium-spore is a sexual product, whereas the Uredo-spore is not.

* De Bary, *loc. cit.*, p. 23.

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The practical inference clearly is, that the fewer the barberry bushes in a district, the less will that district suffer from mildew. The *Æcidium* of *Puccinia graminis* is, however, not confined to the common barberry (*Berberis vulgaris*), but also occurs upon *B. ilicifolia*, *B. canadensis*, and *B. nepalensis*;* upon *B. amurensis*, *B. aristata*, and *B. atro-purpurea*,† and also upon *Mahonia glauca*.‡

I have been informed that during the last few years the game preservers of Norfolk have been rather extensively using some varieties of barberry as cover for game in their plantations; which variety has been employed I cannot say, but the practical importance to the agricultural community is considerable. Appended is a list of the grasses upon which *Puccinia graminis* is known to occur. In this country, I have met with it upon wheat, on twitch (*Triticum repens*), *Dactylis glomerata*, *Poa pratensis*, *Lolium perenne*, and *Avena elatior*.

List of grasses upon which *Puccinia graminis* has been known to occur:—

Phleum pratense
Alopecurus pratensis
,, fulvus
Phalaris arundinacea
Agrostis vulgaris
,, alba
Calamagrostis epigejos
Aira cæspitosa
Avena sativa
,, fatua
,, pratensis
,, flavescens
,, elatior
Poa annua
,, nemoralis
,, pratensis
Molinia cœrulea
Holcus lanatus
Dactylis glomerata
Festuca gigantea
,, spectabilis
,, tenella
Bromus mollis
,, tectorum
Triticum vulgare
,, repens
,, caninum
Secale cereale
Lolium perenne
Elymus arenarius
,, glaucifolius
Hordeum vulgare
,, sylvaticum
,, murinum
,, distichum

PUCCINIA RUBIGO VERA.

It has long been known that two kinds of rust affect wheat, one of which, a state of *Puccinia graminis*, has been fully described in its connection with the barberry *Æcidium*. The other kind of rust is less important to the agriculturist, because it seldom produces any very great amount of injury to the corn crop; yet it does do so sometimes, especially when it attacks the ears. In a recent article upon the agricultural prospects of the country in one of the daily papers, it was said that the red-rust which occurred upon the wheat

* De Bary, *Untersuchungen über Uredineen*, ii., 1866, p. 207.
† Winter, *Hedwigia*, vol. xix., 1880, p. 41.
‡ Berkeley and Browne, *Annals Nat. Hist.*, Jan., 1875. It was found by my friend, Rev. J. Stevenson, at Glamis, Forfarshire; but he informs me he has not met with it since upon this plant.

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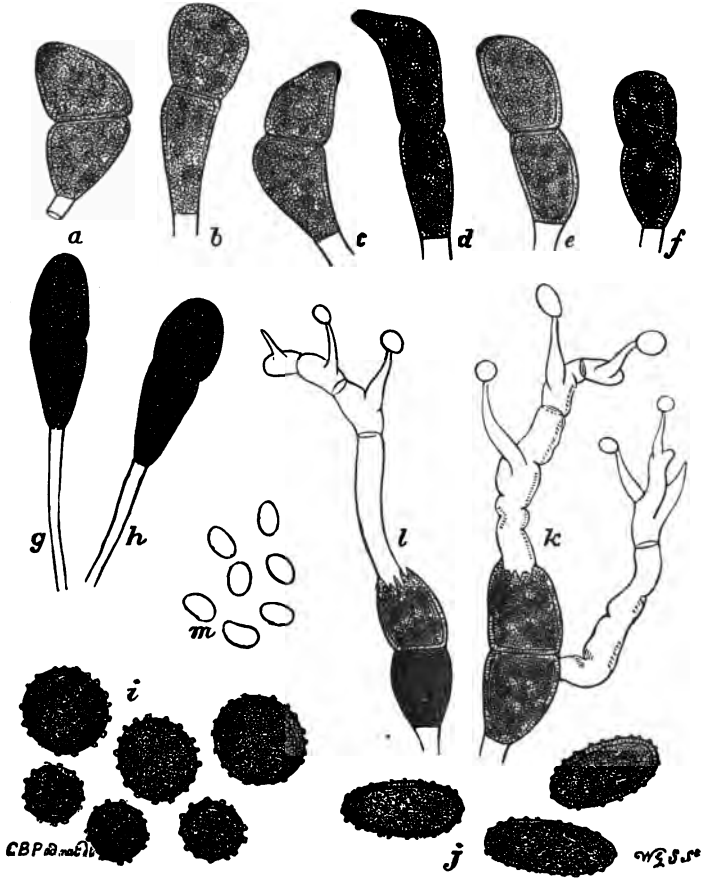

FIG. 5.—PUCCINIA RUBIGO VERA, DC.

a, *b*, *c*, *d*, *e*, *f*, Teleutospores of various forms; *g*, *h*, Teleutospores of Puccinia graminis, showing comparative size and form; *i*, Six Uredo spores of Puccinia rubigo vera; *j*, Three Uredo spores of Puccinia graminis, showing comparative size and form; *k*, Teleutospore of P. rubigo vera on Holcus, which has thrown out two promycelium tubes—May 25, 1882; *l*, ditto, in which one upper cell only has germinated; the lower cell is darker, from the endochrome still being retained in it—May 25, 1882; *m*, Promycelium spores.

From an electrotype supplied by "The Gardeners' Chronicle."

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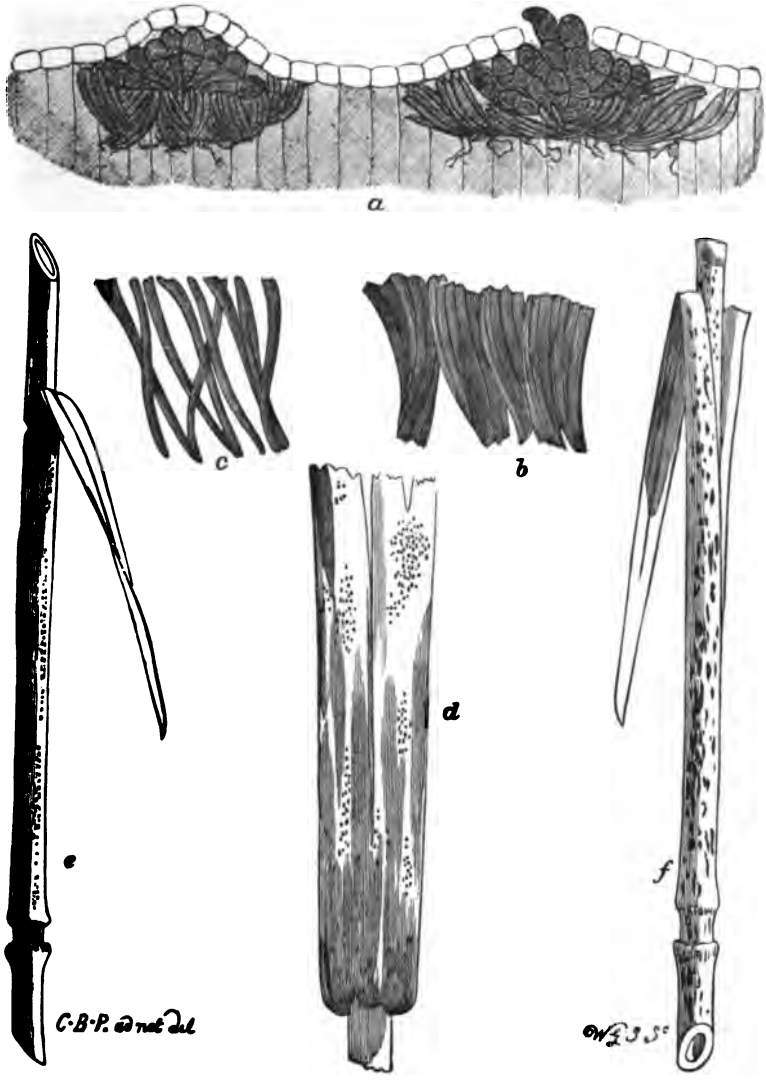

FIG. 6.—PUCCINIA RUBIGO VERA.

a, Two postules, showing the subepidermal nature of the fungus, and bed of paraphyses; *b*, Group of paraphyses; *c*, Separate paraphyses; *d*, Part of a blade of Wheat with the Puccinia rubigo vera upon it; *e*, A piece of straw with the same; *f*, A piece of straw affected with Puccinia graminis, for comparison.

From an electrotype supplied by "The Gardeners' Chronicle."

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plant in March and April* "was considered to afford only a salutary check to premature development, and the wheat plant soon recovered." It is difficult to understand how a parasitic fungus which has once gained admission into the interior of wheat or any other plant can exert a salutary influence, especially when it is borne in mind that this rust is only the early stage of an after-coming *Puccinia*. Surely the wheat plant would, under any circumstances, have enough to do to nourish its own fruit, without having, at the same time, to support a parasite which will last as long as the wheat itself does. The red-rust at present under consideration, was for a long time thought to be a fungus *sui generis*, but is now known to be only the state of a *Puccinia*. This *Puccinia* has not yet been figured in this country, in fact has only been recognised as British since 1878, and I am not aware that any one has pointed it out otherwise than as a botanical curiosity, although, as has been stated above, its *Uredo* state has been known for many years.

Last spring, during the months of March, April and May, many of my agricultural friends were greatly alarmed by the unusual quantity of rust upon their wheats. To such an extent did this occur, that my friend Mr. W. Marshall, of Ely, heard of instances of persons walking through wheat "who had their boots and trousers covered with the red-rust." In some specimens of wheat sent to me for examination, I found *Uredo* certainly upon them, but every yellow patch was not accompanied by spores. This turning yellow of the blade was ascribed by gentlemen who had been connected with agriculture from their youth to the action of frost; and doubtless the cold frosty nights we then had were the exciting cause. The mycelium of the fungus was present in the wheat-plant, and had so reduced its vitality, that when the depressing influence of frost came, the chlorophyl was changed, the plant being unable to withstand the cold nights and sunny days. The sickly yellow look of the crop at this time was observable as one drove about this part of Norfolk, and from our severe visitation of mildew last year it was not surprising that those having a large interest at stake should be alarmed. Now, although the frost showed us the extent to which the disease prevailed, it does not by any means follow that it did harm, on the contrary, its action was beneficial. In causing the death of the affected leaves, it caused the death of the mycelium, which, although unseen, existed in them, inasmuch as the *Uredines* grow only in the tissues of living plants. Of course all the mycelium was not killed, but a great part of it undoubtedly was.

Puccinia rubigo vera (figs. 5. 6), like *P. graminis*, is a hetercecismal fungus, that is to say, it passes a part of its life history in the tissues of some other plant. It is unnecessary to go into the same details as were discussed in my previous paper upon *Puccinia graminis*, all that is required is to mention the points in which these two fungi differ from one another. To begin, as was then done, with the Uredo—*Uredo rubigo vera*, D.C.† *Uredo rubigo*, Berk.,‡ *Cæoma rubigo*, Link.,§ *Trichobasis rubigo vera*, Lév., *Trichobasis glumarum*, Lév.,‖ are

* *Daily News*, July 24, 1882.
† De Candolle, *Flore Franç.*, vi., p. 83.
‡ Berkeley, *English Flora*, vol. v., part ii., p. 375.
§ Link, *Linn. Spec. Plant.*, vol. vi., part ii., p. 4.
‖ Léveillé, *Annales des Sciences Naturelles*, 1846–8.

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various names which have been given from time to time to this fungus. It is smaller and more yellow, covered longer by the unruptured cuticle, with smaller and more globose spores than the Uredo of *P. graminis*. It germinates in a similar manner, and enters the stomata of the host-plant. One great point of difference, however, is that it appears much earlier in the year—it may be commonly met with upon Holcus lanatus in April and May, while the Uredo of *Puccinia graminis* is seldom found until June and July. The teleutospores (*Puccinia rubigo vera*, D.C.) have also received more than one name, viz., *P. striæformis*, West.,* *P. straminis*, Fuckel.† They differ from those of *P. graminis* in being shorter, broader, more irregular, in having very short stalks, and being for a very much longer time confined under the cuticle. The individual pustules are very much smaller and less conspicuous. But perhaps the most remarkable difference is that they are not free amongst the cells of the plant, but are surrounded on all sides and below by a number of dark brown bodies called paraphyses. They germinate in spring after a winter's rest, and produce promycelium and spores. The germ tubes they emit are, according to my observation, shorter and wider. I was very anxious to watch the heterœcism of this fungus in spring. The *Æcidium* is so rare in this county that I knew it was useless to hope to obtain it. The promycelium spores were therefore the only resort, but I failed in obtaining a sufficiency for my purpose, although I applied to my friends, Dr. G. Winter, of Zurich, Dr. Paul Magnus, of Berlin, M. C. Roumeguere, of Toulouse: it was only to hear that the season had gone by for this year. Herr E. Rostrup, however, sent me two specimens from Denmark, one on wheat the other on holcus, but I was not able to get them to germinate. The two teleutospores which are figured germinating were from a specimen in my herbarium, collected in July, 1881, and kept dry until May, when even under these unnatural circumstances, a few of the teleutospores did produce promycelium and spores.

Æcidium asperifolii, Pers., is the *Æcidium* which De Bary‡ has proved to be produced when the promycelium spores of *Puccinia rubigo vera* are placed upon the cuticle of *Lycopsis arvensis* and *Anchusa officinalis*. He has figured them with their germ tubes boring through the cuticular cells of these plants,§ and developing mycelium below‖ in the substance of the leaf. He also found that the spores of *Æcidium asperifolii*, sown upon young rye plants on the 1st and 3rd of August, produced the Uredo of *P. rubigo vera* by the 9th and 11th respectively. The spores of this *Æcidium* are thickly warty, polygonal, and orange-yellow. It must be a rare species, for I have searched diligently for it for some years past, and that especially this year, but always without success, although it is said to have been found near Kings Lynn several years ago. Here, therefore, we have the clearest possible indication that this heterœcismal *Puccinia* must have some other way of reproducing itself without the intervention of the *Æcidium*; how this is

* Westendorp, *Bullet. de l'Acad. de Belgique* xxi., *Notice s. quelques Crypt.*, iv., No. 40.
† Fuckel, *Ennumer. Fungi Nassau*, p. 9. No. 41.
‡ De Bary, *Neue Untersuchungen über Uredineen*, 1866, p. 208.
§ De Bary, *loc. cit.*, p. 215, figs. 3, 4, 5.
‖ De Bary, *loc. cit.*, p. 210.

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effected is a problem I will endeavour to solve, next year if I can, and I am not without hopes of being able to do so.

Puccinia rubigo vera is unusually abundant this year, not only upon various grasses, such as *Holcus lanatus*, *H. mollis*, *Bromus sterilis*, and *Hordeum murinum*. but also upon rye and wheat. Upon the former I found it not only abundant upon the leaves and stem, but also upon the glumes. Upon the latter, since Mr. Marshall sent me teleutospores a week ago, I have found it in great abundance in every wheat field, and I have examined since then a great many in various villages around Kings Lynn. A variety of *Puccinia rubigo vera*, the var. simplex of Körnicke,* occurs in Germany and Denmark as well as in this country. It was first described by Fuckel† as a distinct species, under the name of *P. Hordei;* on the upper surface of the leaves and on the sheaths of *Hordeum murinum*. Specimens were published by Thümen,‡ under the name *P. anomala*, Rostrup.

It is characterised by the small size of its pustules, and by the teleutospores being nearly or entirely one-celled, the upper compartment being more or less in abeyance. The teleutospores measure 44 mk. long by 20 mk. wide.

There is no doubt that the *Trichobasis glumarum* is nothing more than the Uredo of *Puccinia rubigo vera*, for although the spores are not very distinctly verrucose, yet careful examination of them, *dry*, will show that they are not smooth. The ordinary form of the Uredo spores also loses it roughness, to a great extent, when examined in water. The glumes which were earlier in the year affected with the Uredo, will be found later on to bear the teleutospores.

Appended are the spore measurements of the *Puccinia rubigo vera*, expressed in micromills (*i.e.*, $\frac{1}{1000}$ millimetre):—

Uredo, 20—32 by 17—24	Paraphyses, 50—70 long
Puccinia, 26—80 by 16—24	Æcidium, 18—20
Promycelium spores, 10—15 long	Spermogonia, not known

The *Æcidium* in Europe is known to occur on§—

Cynoglossum officinale	Cerinthe minor
Borago officinalis	,, alpina
Anchusa officinalis	Echium vulgare
Lycopsis arvensis	Pulmonaria officinalis
Nonea pulla	,, tuberosa
Symphytum officinale	Lithospermum arvense
,, tuberosum	

Puccinia rubigo vera in Europe is known to occur on*—

Calamagrostis epigejos	Bromus asper
Holcus lanatus	Triticum vulgare
,, mollis	Secale cereale
Arrhenatherum elatus	Hordeum vulgare

* Körnicke, *Land und Forstw. Zeitg.*, 1865, No. 50.
† Fuckel, *Symbol Mycol. Nachtr.*, ii., p. 16.
‡ Thümen, *Herbarum Mycol. Œconom.*, No. 451.
§ Winter, G., *Synopsis Uredineen und ihrer Nährpflanzen* (reprint from *Hedwigia*), p. 12.

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Avena flavescens	Hordeum distichum
Festuca elatior	,, murinum
Bromus secalinus	,, secalinum
,, mollis	Lolium temulentum
,, arvensis	

CAN WHEAT MILDEW PROPAGATE ITSELF APART FROM THE BARBERRY?

If any botanist or agriculturist residing in Norfolk, or in the Fen district, were asked whether wheat ever became mildewed without the presence of the barberry, he would unhesitatingly answer in the affirmative, for the simple reason that we have the wheat mildewed to a greater or less extent every year, while the barberry is a very rare shrub with us. This is one of the strongest arguments used by those who oppose the theory of the heterœcism of *Puccinia graminis*, but apart from this consideration, it is of importance practically. Nothing seems more natural than to suppose the promycelium spores of *Puccinia graminis* should penetrate the leaf or stem of the wheat plant, through the epidermis, by their germ-tubes, and so give rise to the *Uredo*. But De Bary* distinctly says:—"The germination of the spores formed by the promycelium gave me previously the unexpected result that the germ-tubes do not bore through the epidermis of the host-plant. In various parts of *Triticum repens*, *T. vulgaris*, and *Avena sativa*, they remained as if they had been sown upon glass. The tubes turned irregularly in the most different directions, and died off quickly; the grass plant on which they were sown remaining intact.' It is obvious that De Bary is clearly decided in his own mind that these promycelium spores do not penetrate the epidermis, not only of wheat, but also of twitch and oat plants. In my former paper on this subject,† two experiments are mentioned, one of which was unsuccessful; but in the other, performed on April 17th, 1882, five wheat plants were infected with freely germinating promycelium spores of *P. graminis*; on April 24th the plants were uncovered, and on May 7th the true *Uredo graminis* appeared upon one plant. From the fact of these plants being exposed to accidental infection from the atmosphere from April 24th to May 7th, a source of possible error is admitted, which considerably diminishes the value of this culture, for although this experiment was performed at a time of year when the spores of *Uredo graminis* and *Æcidium berberidis* were exceedingly unlikely to be blowing about in the atmosphere, yet my last year's experience in Uredine culture impressed me very strongly with the extreme care necessary to exclude error from the entrance of foreign spores. Still, it must be remembered that the control plants were growing all the time this experiment was going on, in the open air in the same garden, and yet showed no traces of the fungus. This experiment was repeated later on in a more careful manner. On June 29th, four flower-pots were filled with earth, and had wheat planted in them. They were

* De Bary, *Neue Untersuchungen uber Uredineen*, p. 24—25.
† Plowright, *Gardeners' Chronicle*, August 19, 1882, p. 233.

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at once placed under two bell-glasses. Next day some pieces of grass with abundance of last year's *Puccinia graminis* on them were laid upon two of the flower-pots, under one of the bell-glasses. The *P. graminis* had not at that time germinated; it had been for some time in my study, and, previously to being employed in this experiment, was soaked for about a week in pure water. The pots were watered and examined from time to time, and on July 28th, the wheat growing in the pots on which the grass stems were laid had true *Uredo graminis* upon it. The other wheat plants remained free from the fungus up to the end of August. The bell-glasses were thoroughly cleansed before being used, by being washed inside and out, with a strong solution of cupric sulphate. The earth used was purposely taken from a few inches below the surface so as to be free from stray *Uredo* spores, and the flower-pots were new ones. The plants were uncovered for watering, three, or at the most, four times, and then only for a few seconds. The grass on which the *P. graminis* was, was cut into short pieces and laid flat upon the earth, so that as soon as the young wheat plants appeared above the surface, they came into direct contact with it. Some light will also be thrown upon this subject by the investigation of the other heterœcismal *Puccinia*. *P. rubigo vera* has this year been extremely abundant; hardly a specimen of *Holchus lanatus* exists in this neighbourhood without harbouring it. But the *Æcidium* which occurs on various *Boraginaceæ* I have never been able to find. This *Puccinia* recurs year after year on the same plants of *Holchus* with no boraginaceous plant in the vicinity. Again, only yesterday, I walked over some pasture land not very long reclaimed from the sea on which *Puccinia coronata* in both the Uredo and Teleutospore state occurred in the greatest profusion; and to my certain knowledge there is no shrub of either Rhamnus frangula nor cathartica within four miles. All this points to but one conclusion, namely, that the heterœcismal *Pucciniæ* can propagate themselves without the intervention of their *Æcidia*.

The heterœcismal *Pucciniæ* at present known are all found either upon grasses or carices. In this county they are seven in number, namely, *P. graminis* with its *Æcidium* on Barberry; *P. rubigo vera* with its *Æcidium* on Boraginaceæ; *P. coronata* with its *Æcidium* on Rhamnus frangula and cathartica; *P. Molinieæ* with its *Æcidium* on Orchis latifolia, &c.; *P. poarum* with its *Æcidium* on Tussilago farfara; *P. caricis* with its *Æcidium* on Urtica dioica; *P. sylvatica* with its *Æcidium* on Taraxacum officinale. As the *Æcidium* state is known to be the product of the promycelium-spores, one is led to consider whether there be anything in the structure of the grasses and carices inimical to the entrance of the germ-tubes of these spores. In the passage already quoted from De Bary, he speaks of the germ-tubes of the promycelium-spores not boring through the epidermis, and suggestively adds that "they remained as if they had been sown upon glass.' Here, I believe, lies the explanation, these germ-tubes do not bore through the epidermis because they cannot. The amount of silica in *Gramineæ* is well known, and has been spoken of as "Nature's water-proof mantle;" it may with equal truth be said to be "Nature's spore-proof mantle." The germ-tubes of the promycelium spores, it will be remembered, are very diminutive structures compared to most of the Uredo and Æcidium-spores. They are not long enough to travel

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over the surface of the blade and search for the stomata, as those of the latter spore-forms do. The last-named germ-tubes do veritably search for the stomata. The main tube almost always travels across the blade at right angles to its long axis, sending off, here and there, short rectangular branches when it passes over the junction of two cells, as is shown in figures in my previous paper.* Of course the minute germ-tube of the promycelium-spores is quite inadequate to do this. There is no reason, however, why these germ-tubes should not enter any part of the wheat plant that is not armour-plated. In the two experiments just mentioned, in which wheat plants grown under glass were so placed that their plumules came in contact with the teleutospores of *P. graminis*, as soon as they came above ground, became infected with the fungus, while the control plant remained healthy. That this is by no means an impossibe suggestion is shown by the analogous case of Cystopus candidus, in which De Bary found the plants became infected with the fungus through the entrance of the zoospore germ-tubes into the cotyledons. But we are not confined to the plumule as the only vulnerable point; the rootlets may be points of entrance. Considering how constantly stray wheat plants growing upon manure heaps are affected with mildew, this mode of entrance does not seem at all improbable under those conditions. The roots and root-stock of the wheat plant are more likely to be in contact with the germinating teleutospores than when the plant is grown in the ground. The fact, too, of perennial grasses being annually the hosts of various heterœcismal *Puccinia* would also seem to indicate the possibility of the plants being infected through some other channel than the plumule. These points are, however, at present, only suggestions which I hope to put to the proof next spring.

SOME OBSERVATIONS ON THE GERMINATION OF THE UREDINES.

By Charles B. Plowright, M.R.C.S.—Read October, 1881.

While conducting the experiments upon the heterœcism of *Puccinia graminis* and *Æcidium berberidis*, detailed in a recent number of "Grevillea," my attention was drawn more or less directly to the various processes which take place during the development of these fungi. So interesting were these that I was induced to extend my observations to other allied species, and during the summer a continuous series of observations were carried on. As a matter of course, the ground has already been gone over by many other mycologists, and the classical memoirs of M. Tulasne, which are in themselves well-nigh exhausted, leave but little margin for startling discoveries of unexpected novelties; yet so important is the subject in an economic point of view, and so interesting are many of the phenomena which

* See fig. 1, *o*; fig. 3, *i*.

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take place, that I venture to bring the subject forward again, and to narrate what I saw, as well as to add some of the more important observations of the distinguished French mycologist, M. Tulasne.

In the "Handbook of British Fungi" the *Uredines* are distributed over three orders, viz., *Puccinei*, *Cœomacei*, and *Ædidiacei*. Excellent as this arrangement has proved itself to be to the present generation of British and American mycologists, it is quite probable that when the next edition of the "Handbook" comes to be prepared, certain modifications will be made; some genera now disassociated will be united, or at any rate brought nearer together. Any such alterations, should they be made, will certainly not be brought about by the desire of the editor to pander to the strange vagaries now in vogue in certain quarters concerning mycological nomenclature, but will owe their existence to that progressive accumulation of knowledge, mainly the outcome of physiological research, which from time to time antiquates the best systems of classification in all departments of natural history. From no standpoint do we obtain so clear a view of the affinities of various forms of organic life as when we devote ourselves to the investigation of their development. Now, there exist two distinct modes in which the germination of *Uredines* takes place, which, for want of better names, may be called the *Puccinoid* and the *Uredinoid*, inasmuch as the former is proper to the *Pucciniæ*, while the latter is met with more constantly amongst the members of the so-called genus, *Uredo*. But it must not be supposed these two modes of germination are absolutely confined to the two forms of fungus-life just mentioned; on the contrary, as will be shown hereafter, the *Pucciniæ* may, and do sometimes, germinate after the manner of the *Uredines*, and *vice versâ*.

Puccinoid Germination.—As a general rule, the *Puccinia* spore may be regarded as the resting spore of the *Uredo*, or at any rate, if not absolutely the resting spore, at least the spore which retains its germative energy the longest. Very many of the *Pucciniæ* will not germinate until the spring following the summer or autumn in which they were themselves produced; but this is not invariably the case. To take one instance only—*P. epilobii*, D.C., germinated freely with me in from 48 to 72 hours.

Tulasne has shown that the germination of the *Puccinia* spore is brought about by the protrusion of the germ-tube through an opening in the epispore (fig. 25). This tube is destined to produce secondary spores at its peripheral extremity, and is never of any great length. There is usually only one germ-tube for each primary division of the spore. The figure quoted above is taken from Tulasne's Memoir, and shows the process as observed by him in *Puccinia graminis*. In other words, puccinoid germination implies the production of secondary spores, and is found in *Triphragmium*, *Phragmidium*, *Puccinia*, *Podisoma*, *Uromyces*, *Coleosporium*, and in the winter spores of *Melampsora*.*

The secondary spores are born upon the terminal extremities of short tapering branches given off by the primary germ-tube after it has become septate, and are

* Probably also *Xenodochus*.

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either spherical, oval, or subreniform. Fig. 20 shows a recent spore, *Puccinia epilobii*, D.C., producing these secondary spores.†

Uredinoid Germination.—The *Uredo* spore is essentially ephemeral in its nature, and does not retain the power of germination for any great length of time. The germ-tubes which are thrown out by *Uredo* spores are destined to penetrate the tissues of the living plant upon which the parasitic fungus grows, their main function being not the production of secondary spores, but the direct reproduction of the parasite. They invariably, I believe, germinate the same year they are produced. This mode of germination is met with in *Uredo*, *Trichobasis*, *Æcidium*, and *Peridermium*. In order to save repetition, however, the following is a detailed account of the process of germination observed in *Uredo linearis*, Pers., during the month of August, 1881, and is not based upon a single experiment, but is the outcome of a great many observations made at the time stated. When the spores of this fungus, which are more or less ovoid in form, are sown upon a drop of water on a glass slide, and placed under a bell-glass, so arranged that the atmosphere within the bell-glass is full of moisture, they very soon begin to germinate. As early as five hours and forty minutes they were found to have thrown out two germ tubes, one from each side of the long diameter of the spore, near its centre (fig. 1). Sometimes only one tube was observed, but generally there were two. These tubes were hyaline, and filled with very pale yellow endochrome from the interior of the spore, and were of uniform diameter, as nearly as possible, throughout their entire length. As a rule, only one of these two twin tubes went on growing, *i.e.*, increasing in length. When the major tube attained a length equal to several times the diameter of the spore from which it sprang, it took a series of spiral turns from right to left or *vice versâ*. At this stage the tube presented a uniform diameter from end to end, but very soon the basal portion of it became enlarged and empty, and soon afterwards, at a short distance from the spore, a septum appeared, which cut the empty base of the germ spore from the remainder. Before, however, this septum made its appearance, the abortive germ-tube became quite empty. and the greater portion of the endochrome contained within the spore itself was transferred to the growing tube (fig. 4). This transferrence of endochrome from the interior of the spore to the growing germ-tube always took place. The yellow granules were plainly to be seen moving towards the distal extremity of the tube. Sometimes they were more diffused than at others, but the great bulk of endochrome was always to be observed nearest the distal extremity, not always, however, at the extreme end of the tube, but often a short distance from it (fig. 4). The active tube continued making spiral turns upon itself like a corkscrew. The actual number of turns varied, as did their direction, whether from right to left or left to right. Very often, too, the tube would turn two or three times in one direction, and then, reversing its movements, take a few turns in the opposite direction. The diameter of the helix, too, was subject to considerable variation. The sides of the tube were parallel to each other, and its diameter uniform. At the extreme end, which was blunt, there now appeared

† The subject of puccinoid germination is fully treated of and well represented in "Fungi their Nature, Influence, and Uses" (Cooke and Berkeley), p. 143—149.

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numerous irregularities, which were incipient branches (fig. 5). Not unfrequently the end of the tube trifurcated in the manner of a trident (figs. 6 and 7). Usually one only of the main branches of the trident continued its growth, the others remaining rudimentary. From this point all semblance of regularity in the contour of the tube was lost, and it gave off lateral branches, somewhat after the manner of a stag's horn. The extremity of the tube did not even now lose its tendency to convolute, although this movement is considerably diminished (fig. 8). The yellow endochrome had by this time all accumulated in the irregular branched part of the tube, for although the lower portion above the septum was obviously not empty, yet the only distinctly yellow colouration was to be seen in the distal branched portion.

It is obvious that the spiral movements above described are of great importance to the fungus, as by them the growing mycelial tube has the chance of its catching on any irregularity of the cuticle of the best plant greatly increased. This catching power is enhanced too by the trident-like terminal extremity with its irregular branched outline. It is possible that the non-development of some of the terminal branches is not a purely accidental circumstance, but a provision by which the mycelium may become fixed upon the leaf, while the favoured branch is penetrating it. The ultimate changes which were observed in the mycelial tube were simply that it appeared to become septate.

Similar results to the above were obtained from watching the germination of the *Uredo* of *Coleosporium tussilaginis*, Lev.; of *Phragmidium mucronatum*, Link; of *Uromyces appendiculata*, Lev.; and of *Æcidium crassum*, Pers.

On the 12th and 13th August, 1881, some spores of *Uredo linearis* were observed to germinate in quite a different manner, for instead of producing the irregularly outlined branches (the stag's horn branches), the terminal extremity of the tube became expanded in a globular manner, into which all the yellow endochrome accumulated (figs. 10—12). Often a secondary globular expansion took place at a lower part of the tube (figs. 11 and 12). Whether these bodies were really secondary spores, and, as such, fell away from the tube, or whether they were simply reservoirs into which the endochrome was accumulated previous to making a fresh departure in mycelial development, could not be clearly made out, but as they were not observed presenting any tendency towards the isolation of their contents by a basal septum, nor were any of them subsequently to be seen floating about, as they must have done had they fallen off, the presumption is in favour of their being endochrome reservoirs. Be this as it may, this method of germination presents a very much closer analogy to the true puccinoid germination than was observed in any other *Uredine*, excepting in *Coleosporium*,* in which genus it seems to be the normal method.

The *Æcidia*, as far as I have observed them, germinate in the same manner as other *Uredines*, although Tulasne has described and figured one species *Æc.*

* Tulasne, "Ann. des Sciénces Nat.," 4th Series, t. 8, f. 1, 8, 10, and 11.

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euphorbiæ sylvaticæ, D.C., in which true puccinoid germination appears to have taken place.†

Fig. 21 shows a spore of *Puccinia epilobii* in which both modes of germination have taken place, the two narrow tubes being the commencement of uredinoid mycelium, whilst the wider tube is the beginning of a puccinoid germination tube.

In observing the process of germination in various *Æcidia*, numerous minute spherical hyaline spores were encountered, that at first were supposed to be those of some stray mucedine. But that these bodies were connected in some way with the *Æcidium* seems distinctly shown from the fact that they were found in *Æc. berberidis, urticæ, tussilaginis* and *crassum*, immediately after the specimens had been gathered, and moreover in specimens that were collected of each of these species at various times, in habitats miles apart. They were furthermore not seen accompanying the spores of any other *Uredine*. These minute bodies were nearly globular or sometimes slightly ovate, measuring from two to three micromills across, and were often clustered around the *Æcidium* spores apparently adhering to them (fig. 2).

Another circumstance is worthy of record in connection with the germination of these fungi, viz., the occasional presence of an oval, cylindrical, uniseptate pale yellow spore, intercalated in the mycelial tube given off by certain species. This was observed in *Æcidium berberidis*, and *tussilaginis*, *Puccinia malvacearum*, and *Epilobii*, and in the *Uredo* of *Uromyces appendiculata* and of *Coleosporium tussilaginis*. These spores varied in size from 15 to 20 mk. in length, to 5 to 10 mk. in width; they were nearly hyaline, with a pale yellow tinge, uniseptate, with rounded ends, in fact very like miniature *Puccinia* spores. What their precise nature is it is not intended to affirm, but it would be interesting to hear if they have been encountered by other botanists who have studied the germination of the *Uredines*. The only suggestion which presents itself to my mind is that they may be abortive attempts at fructification on the part of a mycelium grown under abnormal conditions, which attempts have assumed a form similar in contour with the most permanent spore as we commonly meet with it (figs. 22, 23, and 24).

The following are the species of *Uredines* which were made the subject of study:—

Uredo of *Phragmidium mucronatum*, Link.
,, *Puccinia graminis*, Pers.
,, ,, *Epilobii*, D.C.
,, ,, *Arundinacea*, Hedw.
,, ,, *striola*, Link.
,, *Uromyces appendiculata*, Lev.
,, *Coleosporium tussilaginis*, Lev.
,, ,, *Sonchi*, Tul.
,, ,, *Senecionis*, Schum.

† Tulasne loc. cit. plate 9, f. 24 to 33. Cooke and Berkeley. Fungi; their Nature and Uses, p. 142, f. 81.

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EXPLANATION OF PLATE.

Fig. 1.—A spore of *Uredo linearis* germinating. Two tubes have been thrown out, one from each side the spore near its centre. Each tube is filled with yellow endochrome from the interior of the spore (5 hours 4 min.).

Fig. 2.—Two spores of *Æcidium berberidis* with minute spherical secondary spores (?) adhering to them.

Fig. 3.—A group of these bodies, secondary spores (?).

Fig. 4.—A spore of *Uredo linearis* (20 hours), from which two tubes have, in the first instance, been thrown out; one only has developed, and towards the end of this the yellow endochrome is being passed. The base of this tube is cut off by a septum, below which it is empty, as is the abortive tube.

Fig. 5.—Germinating spore of *Uredo linearis* (23 hours). The distal extremity of the tube contains all the endochrome. The walls of the tube here show signs of incipient branches. The tube has taken two spiral turns from left to right.

Fig. 6.—A spore of *Uredo linearis* (24 hours), showing the trifurcation which not uncommonly takes place; one of these branches has gone on growing, but the walls of this portion of the tube are thinner and much more irregular in outline than the older portions. The endochrome has all accumulated in this part of the tube. 13th August, 1881.

Fig. 7. A spore of *Uredo linearis* (20 hours), in this germinal tube has taken three perfect turns upon itself. The hollow basal portion shows indications of two additional, but abortive, tubes. The endochrome should have been shown confined to the trident-like part of the tube. 22nd August, 1881.

Fig. 8.—Shows the further development of a germ tube; the extreme end only is shown. The tube here consists only of a very thin wall, in which, however, all the endochrome has accumulated. But it has thrown out numerous branches at right angles to the growing axis. The extreme end still retains its tendency to convolute. 22nd August.

Figs. 10, 11, and 12 show three examples of *Uredo linearis* in which, instead of producing the thin-walled, irregularly-branched ("stag's horn") extremities, the endochrome has accumulated in globular expansions of the germ tube. In figs. 11 and 12 secondary globes are just beginning to be formed. The tubes are themselves quite empty, all the endochrome having accumulated in the globose expansions, which consequently have a distinct yellow colour. 13th August, 1881.

Fig. 13.—A spore of *Æcidium tussilaginis* which has germinated very actively in 10 hours. The germ tube has taken eight or nine spiral turns, at first from left to right, then reversing its movement, has turned from right to left. The endochrome has accumulated entirely at the extreme end.

Fig. 14.—Spore of *Coleosporium sonchi arvensis*, after 24 hours. The two upper segments of the spore are quite empty, all their contents having been removed to the germ tubes. The apical tube is given off from the end of the spore, the other laterally. The analogy between the germination of this spore and of these figured at 10, 11, and 12 is very striking.

Fig. 15.—Spore of *Æcidium tussilaginis* (16 hours), in which the endochrome is seen passing up the tube, but has not yet reached the extremity.

Fig. 16.—Spore of *Æcidium tussilaginis*, in which the primary tube has divided into two equal branches, each of which has taken on independently spiral convolution (40 hours).

Fig. 17.—Spore of *Æcidium tussilaginis* which, in 40 hours, has thrown out a tube that has undergone very irregular spiral convolutions.

Fig. 18.—Spore of *Æcidium crassum* in which germination has just commenced. It is impossible to say which of the budding tubes will eventually develope, but one, or at most two, will do so.

Fig. 19.—Germinating spores of *Coleosporium tussilaginis (uredo)*, 48 hours.

Fig. 20.—Germinating spore of *Puccinia epilobii* (72 hours) producing two secondary spores.

Fig. 21.—Spore of *Puccinia epilobii* which, in 48 hours, has thrown out one wide and two narrow tubes; the former will produce secondary spores (puccinoid germination).

Fig. 22.—A spore of *Puccinia epilobii*, in which both segments have thrown out tubes; in the upper tube a uniseptate intercalated spore is seen, 15 mk. long by 5 mk. wide.

Fig. 23.—Germinating spore of *Uredo fabæ*, with intercalated spore (15 × 8 mk.), 96 hours.

Fig. 24.—Germinating spore of *Æcidium berberidis* with intercalated spore (20 hours).

Fig. 25.—Germinating spore of *Puccinia graminis* taken from Tulasne. The tube from the upper segment is broken off, while that from the lower segment is seen in its upper part to be divided by three septa. From each division a pointed branch arises, which bears at its extremity an oval or subreniform secondary spore.

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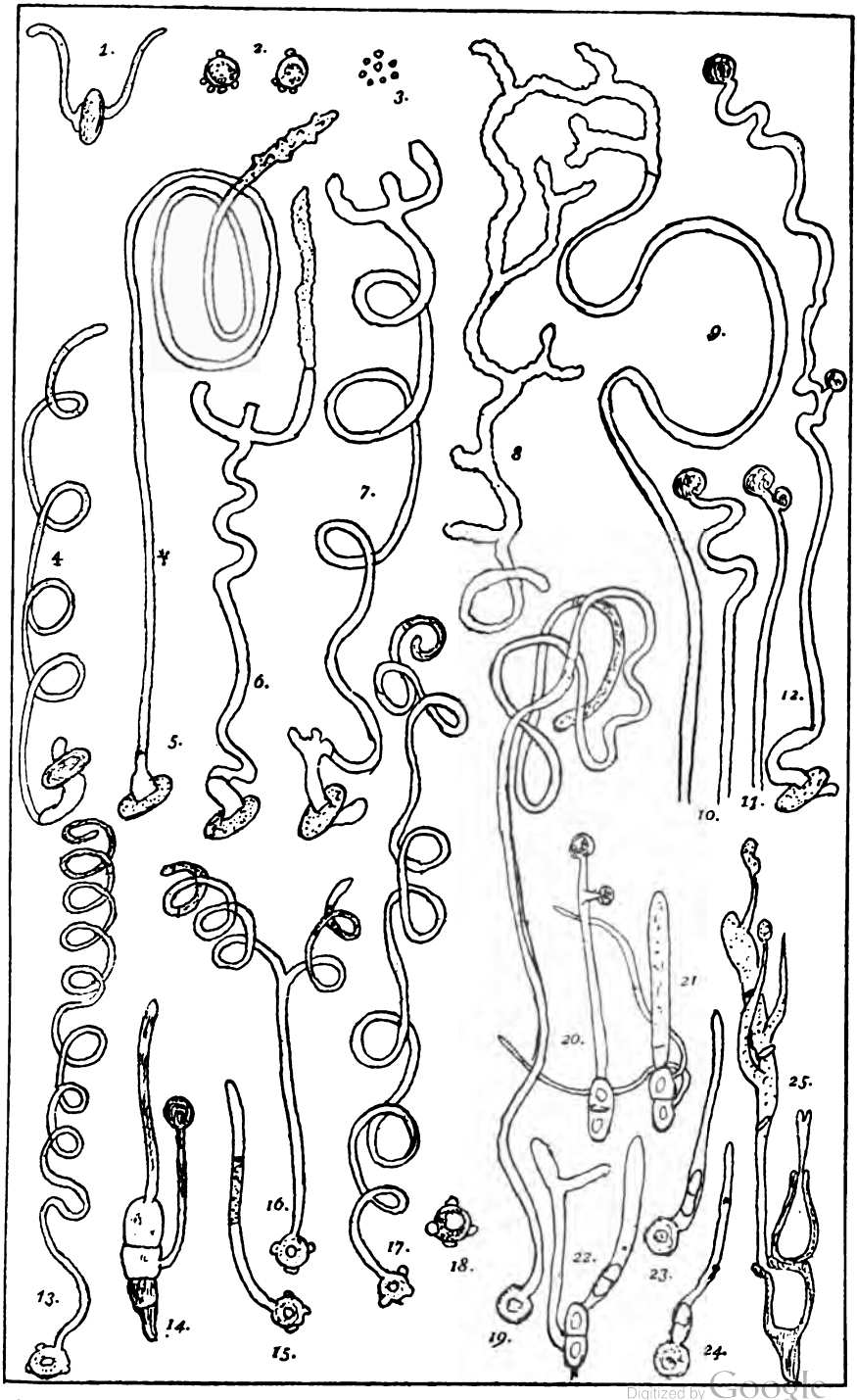

C.B.P. ad nat. del.

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Germination of Uredines

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Puccinia malvecearum, Corda.
,, *Epilobii*, D.C.
Coleosporium Sonchi, Tul.
,, *tussilaginis*, Lev.
,, *Senecionis*, Schum.
Æcedium berberidis, Pers.
,, *tussilaginis*, Pers.
,, *crassum*, Pers.
,, *urticæ*, D.C.
Peridermum pini, Chev.

EXHIBITION OF APPLES AND PEARS AT HEREFORD.

1881.

THE report of the annual Apple and Pear Exhibition, held on October 26th and 27th, was correctly published in detail in the local newspapers. The important objects of the Exhibition are repeated :—

1.—To encourage the growth of valuable fruit in place of worthless varieties.
2.—To name fruits unknown to the exhibitor.
3.—To afford information to the Committee, and
4.—To provide characteristic specimens for illustration in the *Herefordshire Pomona.*

The Fourth Part of the *Herefordshire Pomona* was completed, and issued to all members who had paid their subscriptions for a copy. No apology is required for introducing here some critical opinions on this magnificent work.

THE "HEREFORDSHIRE POMONA."

Technical Editor—ROBERT HOGG, LL.D., F.L.S.
General Editor—H. G. BULL, M.D., &c.
Hereford: JAKEMAN AND CARVER, High Town.
London: DAVID BOGUE, 2, St. Martin's Place, Trafalgar Square.
PART IV.—PRICE 21/-

THE fourth part of this magnificent work, which bears the self-explanatory title of *The Herefordshire Pomona*, has now been issued, and we may say at once that it is in every way worthy of its predecessors. The part contains the completion of the practical treatise on "The Orchard and its Products—Cider and Perry," and deals with the management of the fruit and cider-house; the process of fermentation, its

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theory, varieties, practice, and difficulties; the manufacture of cider and perry; and an article on "The Orchard in its commercial aspect," from the able pen of the Rev. C. H. Bulmer, M.A. In addition the part is enriched and beautified by the coloured portraits or wood-cut outlines of sixty-four varieties of fruit, the names of which are as follows—

APPLES.—Borovitsky, College Apple, D'Arcy Spice, Early Nonpareil, French Codlin, Herefordshire Beefing, Jolly Beggar, Norfolk Beefing, Oslin, Old Codlin, Pitmaston Russet, Red Astrachan, Ribston Pippin, Royal Codlin, Royal Russet, Sack and Sugar, Striped Beefing, Sturmer Pippin, Transparent Codlin, Wheeler's Russet, Whorle Pippin. *Cider Apples*—Cider Lady's Finger, Eggleton Styre, Gennet Moyle, Old Bromley, Red Royal, Skyrme's Kernel, Styre Wilding, White Styre.

PEARS.—Alexandrine Douillard, Ambrosia, Aston Town, Auguste Jurie, Beurré Blanc des Capuchines, Beurré Bosc, Beurré Clairgeau, Beurré d'Anjou, Beurré Giffard, Beurré Six, Brown Beurré, Délices d'Hardenpont, Duchesse d'Orléans, Durondeau, Fondante d'Automne, Emile d'Heyst, Hessle, Jargonelle Passe Colmar, Sanguinole, Seckle, Souvenir de Congrés, Summer d'Aremberg, Summer Doyenné, Swan's Egg, Susette de Bavay, Tardif de Mons, Thompson's. *Perry Pears*—Chaseley Green, Holmer, Moorcroft, Oldfield, Taynton Squash, Thurston's Red, White Squash.

The chromo-lithograph portraits are distinguished by much beauty and great fidelity.

The completion of the treatise affords much interesting and valuable reading; and growers and ciderists, however experienced, will probably, one and all, be able to glean something remunerative and suggestive from its perusal. Practical information, clearly expounded, is to be found in almost every line. The article on "Fruit Management" is subdivided into three parts, thus—"Fruit Gathering," "Apple Heaps," and "The Mill." We extract the following for the benefit of our cider-making readers. Dealing with the question of "Apple Heaps," the writer says—

"The heap should most certainly be protected from all changes of weather, which cannot fail to be injurious to it. When placed in the orchard, therefore, the heaps should be made in rows that can be protected by thatched hurdles resting on a pole, running the whole length of the heaps, which are at all times readily moved or replaced, and covered with cloths or tarpaulins if frost should set in. The sun causes the fruit it falls upon to ferment unequally, though it seldom shines sufficiently, at least in England, to do much mischief in the autumn. Rain, which is so frequent at this time of the year, injures the quality of the fruit very seriously. If anyone doubts this let him put a whole and sound apple into a glass of clear water, and let it remain there for seven or eight hours. By this time the water will have taken a rosy hue with the sweet taste of the apple, while the apple itself will have lost much of its flavour. The explanation is that by the natural laws always in operation between fluids of different density, the water has kept passing into the apple, and the juice has passed out into the water, greatly to the injury of the fruit. Frost is also very injurious to fruit, for after it has been frozen it

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will never ferment properly. A French chemist found the loss to be about one and a half per cent. of alcohol in fruit that had been frozen. It is most desirable, therefore, that the fruit-heaps should be well protected, even if it may not be thought advisable to place them in some open shed or wain-house. Protection of the fruit from frost is as little thought of in Herefordshire as it is from rain. During the winters 1878-9, and 1879-80, though fruit was scarce, and both winters exceptionally severe, it was a rare circumstance to see the apple heaps about the orchard in any way protected."

If the *Herefordshire Pomona* only succeeds in inducing the cider-growers to make the most of their fruit by protecting it when in heaps, it will have performed a practical service of considerable value. Passing on we find scientific and exact information with regard to fermentation, and practical explanation of the process: and we learn that well-fermented cider of good quality should contain from five to ten gallons of alcohol in 100 gallons of liquor. Some exceedingly useful remarks are made on the difficulties of fermentation, &c.

We have to thank Mr. Bulmer very cordially for his valuable contribution to the literature of the *Pomona* in the articles on "The Orchard in its commercial aspect." It is at the same time practical and interesting, and perhaps the writer will pardon us if we extract a few of the facts which it contains. We find that Herefordshire has a larger acreage of orcharding than any other county in England, contributing 26,683 acres out of a total of 175,200 acres. The next is Devon with 25,758 acres, then comes Somerset with 22,933, Worcester 15,854, Kent 14,685, and Gloucester 14,178. Salop has 3,248 acres only. One-sixth of the orcharding in Herefordshire may be put down for the production of pot fruit, which at the low estimate of 60 bushels to the acre, at 3s. a bushel, would produce £39,930. The remaining five-sixths, or 22,213 acres, for the production of cider or perry, would, says Mr. Bulmer, yield an average of two hogsheads (200 gallons) an acre, which at 6d. per gallon would give £111,065, and thus, at a purposely low computation, the yield would be at the rate of £5 13s. per acre, while, if the best cider or perry was made, the profit would, as a matter of course, be much greater. The total annual value of the Herefordshire apple and pear crop thus amounts to the very large sum of £190,925. In the household accounts at Holme Lacy, in 1662, cider is set down at 34s. the hogshead, while the present market price for the best quality sold by the manufacturer, in cask, is from 1s. to 1s. 2d. a gallon. It is a rather curious fact that in 1662, according to the household accounts just referred to, beer cost 10s. a hogshead less than cider.

Mr. Bulmer asserts, and with undoubted truth, that—"The condition of the orchards at the present time is most unsatisfactory, and the closest attention will be required to restore their value." He goes on to urge as a first step the subjection of the orchards to a thorough revision; useless trees to be removed root and branch, and their places filled by good varieties; varieties which are inferior, but which are vigorous and healthy, should be beheaded as far from the main trunk as possible, and grafted with strong growing scions of well-proved kinds.

In dealing with the question of orchard prospects, the writer adopts, on the whole, a favourable view, being of opinion that there is "Every reason to believe

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that steady perseverance in orchard culture will meet with a successful reward." Among other suggestions he throws out one which we should like to see adopted, viz., that Agricultural Societies in the special fruit districts should hold annual exhibitions of fruit, and offer prizes for the best collections. He further suggests that the theory and practice of horticulture and fruit-growing might be introduced with great advantage into our elementary schools as a science subject. Many other points are touched upon to which our space will not allow us to refer.

Too much praise cannot be given to the coloured portraits and the cuts, and the manner in which the whole work is compiled and turned out is of the best, and we must not omit to state that the drawings are from the pencils of Miss Edith Bull and Miss Alice B. Ellis. Mrs Stackhouse Acton (who executed the greater part of the drawings of Knight's *Pomona*) has also contributed a drawing of the *Eggleton Styre*, on plate xxix. The editor is to be congratulated on the way in which he has performed his labours; and there can be no doubt that the *Herefordshire Pomona*, when complete, will form a standard work of the highest and most valuable description. We observe that the work will be completed in three more parts, to be published annually.

ABOUT ORCHARDS.

APPLES date at least as far back as Adam, and apple orchards are of some antiquity. Orchards of apple trees were planted by the Druids, no doubt with an eye to having mistletoe on them. Apples were brought, at an early period, to England from Normandy, and by the Normans, in large numbers, when they came here with the Conqueror and divided amongst them our fairest fields—for "apple gardens" are mentioned in Domesday Book. And for these gardens, or "orchards" as they were afterwards called, the county of Worcester soon took the lead; and in such high esteem were its orchards held at the close of the reign of Henry III., that in 1276—but four years from the date of the death of that king—apple-grafts were brought from there for the Royal garden at Westminster, as being the best that could then be procured.

From that time the quality of the fruit improved, though slowly, until the reign of Henry VIII., when, as with grafts from Flanders, he got better trees, he ordered a quantity of them to be planted in Kent—some say in thirty villages—thus giving to that county a supremacy which it still retains. It has, however, been only by repeated propagation and graftings since that day that from the original stock of the apple—the wild crab tree—we get the splendid produce which is now to be had in our markets, of which the named varieties exceed two thousand, though in the time of the Romans only twenty-two sorts were known.

Pear-grafts had been used in the previous reign, as records exist of their purchase by the Earl of Lincoln for his garden in Holborn, and by the Earl of Warwick for his orchards in Warwick Lane. The example of fruit planting thus set by the King was followed ere long by the people in what are now cider counties, Somerset, Devon, and Hereford; the latter ultimately becoming by the efforts of

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Lord Scudamore, "one vast apple orchard"—to use Evelyn's words—as it has been since then, and still is to this day. In England, however, the orchards of the now two famous counties of Worcester and Hereford furnished chiefly, at that time, fruit fit only for cider, until the men of Kent led the way by growing best fruit also in their fields and hop-gardens; and hop and fruit cultivation have since then gone hand in hand; and this is the way they manage it:—

The trees being planted at intervals, are allowed to grow for seven years with the hops, when the crop is got up and the ground laid down for grass, which is then eaten off by sheep, and as hop-ground is the very best of ground—"for the greatest profit in hop-growing," says an old writer, "is the breaking up of the soil afterwards"—orchards thus formed bear apples well. A further profit, too, is made by planting alternately with them plum and cherry trees, with cob-nuts between the rows—the three kinds of fruit the soil there suits best; pears—except the "Hessle," which, like the Worcestershire "Jennett," bears always well—being but little grown in that county. Herefordshire too, though growing best apples, produces very few pears, though pear trees are hardy; in fact, the latter will bear well, however much you may cut them, when the former are quite worn out. In proof of this we may mention the old orchard at Newland—that Barland orchard between Powick and Malvern, where the pear trees still bear abundantly, though they must have been planted there as early as four hundred years ago, or, as some say, six hundred years.

Pears, as apples also, came from the East into Italy, and thence into Gaul and Britain; as when the Romans settled in our island and built luxurious villas, they introduced into their gardens, from time to time, the fruits they had known in Italy. "Worcestershire," says Dr. Bull, "was noted for them at an early period, and they were adopted as an emblem by the people of that county, as we find in the poetical account, by Drayton, of the battle of Agincourt (1415), wherein he says that the feudal retainers of the Beauchamps, and other great landowners, who owed suit and service to the Crown, bore, as their standard in the field, 'a pear tree laden with its fruit;' and to this day, in the arms of 'the Faithful City' are three black pears—those pears which are called 'iron-hearted.'" The origin of this addition, by the bye, is thus accounted for:—When Queen Elizabeth came to Worcester, a pear tree. in full bearing, was planted by the gate, that she should see it as she entered, and so struck was she with its beauty, and with the fact that its fruit, though within reach, remained untouched—as if testifying to the behaviour of the worthy citizens—that she directed three pears should henceforth be added to the arms of that honest city—three "black" pears, so the tale goes; and the "Black Pear of Worcester" still grows there. It is a large pear, so large, indeed—growing to the weight of two pounds or more—that it often has to be netted; but, being so hard, it is only fit for stewing.

"From the earliest periods," says Dr. Bull, "the apple has ever been held in the highest esteem, and its merits are so great that we cannot wonder that it should be surrounded with so many poetical and superstitious fancies." These fancies exist in almost every country. Dr. Bull goes fully into the folk-lore of apples, but I shall only quote one short passage from his book, the *Herefordshire Pomona*:—

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"The apple still holds its place in the customs of many nations; always the emblem of fertility, and usually the symbol of happiness. It is oracular in love matters—an omen of love, a love-charm, or a token of affection. Auguries are to be drawn from a cutting of an apple in half, the number of its pips, throwing the peel over the shoulder, sleeping with an apple—or a half of one—under the pillow, when a lover brings the other half, etc. If the tree blossoms out of season, it betokens joy, or some unlooked-for sorrow, as the wit of the observer is enabled to solve the enigma; and a present of apples is ofttimes the symbol of a matrimonial proposal. In some countries, it may also be added, it has been the custom to place an apple in the hand of a child when buried, that it may have it to play with in Paradise."

The freak of nature herein alluded to is by no means uncommon, as we have each year, for many years, seen blossoms with fruit, as we did on some apple trees six weeks ago; the blossomed sprays being as beautiful as one sees in May, though the apples close by them were being picked for cooking.

Apples were formerly used as "pomanders," and we have the term in Shakespeare, and in Drayton too, as being worn "against infectious damps;" whilst Bacon says "they have in physick use of pomanders and knots of powders for drying of rheums;" and in his *New Atlantis* is this further passage, which clearly points to the apple: "The notary came aboard, holding in his hand a fruit like an orange, but of colour between orange-tawny and scarlet, which cast a most excellent odour, and is used for preservative against infection." Soon after oranges came into England, and they were first grown at Beddington by Sir Francis Carew. The fashion changed, however, from apples pure and simple to oranges hollowed and filled with spices, or with a sponge "whereon was vinegar and other confections against the pestilent airs;" and the former mode is historical, as an orange, stuck full of cloves, was taken from the pocket of King Charles I. by his executioner, Richard Brandon. The latter mode, too, we read in history was adopted by Cardinal Wolsey; "the which," says Cavendish, "he commonly smelt into, passing among the press." These orange pomanders—as were the apple ones previously—are shown in the portraits of that period as being held in the hand; and an orange stuck with cloves was a common present, the superstition connected with it being probably due to that ancient notion of the Egyptians, that a citron eaten in the morning was a certain antidote against all kinds of poison.

Next to raw potatoes, there is certainly no better preventative to scurvy than good raw apples. Hence the captains of ships would do well to carry them, and especially so, as if they do not, as is claimed for them, prevent sea-sickness, they assuredly lessen the evil. It is often the only food a sick stomach will take; it is a welcome fruit to many. Passengers from New York to Liverpool are awake to this fact, and gladly partake of the excellent apples on board. In fact, the apple is the healthiest fruit we have, and though those who claim for it the cause for direct brain power are certainly far ahead of their time—"for vigorous thinking," the phrase is, "eat plenty of apples"—still, there is more benefit to be gained by the consumption of this fruit than many men would believe, and it is good alike cooked or raw.

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With the growth of apples soil and aspect have much to do, as is proved by the fact that while the selfsame kind will change with locality into a different colour, size, and flavour, some apples can be cultivated successfully only on certain soils, or under the influence of local climate. Thus, the Newtown Pippin belongs as much to America as does the true Ribston Pippin to England; and an apple which is a good bearer in one county is often good for nothing in another; hence the importance of crossing varieties. The soil of Worcestershire is suited to both apples and pears, as they like a strong loam, with some limestone under; and both trees will grow there to the size of an oak, and bear thirty bushels of fruit—sufficient for two hundred gallons of cider or perry. Kent soil suits them too, as shown by its growth and produce; and an apple tree may be seen there—belonging to the great grower and "shower," Mr. Skinner—which, covering a space of 140 feet, had, two years ago, on it 150 bushels of fruit.

If the Worcester and Hereford men would but adopt the sensible Kentish mode of letting in air and light, their orchards would then pay cent. per cent. But bushed orchards in those counties are almost the rule, and so bushed are some that they are dim in daylight, and the lush grass in them of the deepest green, for the sun never shines upon it. What might, therefore, be good table fruit, keeps sour and harsh, as it cannot ripen, and is thus only fit for cider. If the Kent men in a good year can clear from fruit-land, as they say, £100 per acre—and it is believed to be a true statement, and not an assertion—it is a proof of what constant care will do, and growers elsewhere would do well to tread in their steps. Take but one county only—say, Hereford, where the orcharding is upwards of 26,000 acres. Look at the extra gains men might make there if they would but open in every hollow those dense screens of apple leafage which meet the eye—there, and amongst their Worcester neighbours too. But as their grandfathers did, so do they, with but few exceptions, and thus they lose much money. "Why," says a writer on English agriculture, "do we not turn fruit growers? I was in Covent Garden Market yesterday, and there was £20,000 worth of fruit there, but all from abroad." But then foreign fruit comes to market in good condition, and almost as fresh as when on the tree, the result of proper packing; whereas home-grown, for lack of it, will not fetch paying prices; and this fact brings us to the present time of year and "apple-picking."

With the advent of October, and the hops all in, what may be termed "the last harvest of the year" begins—"the apple harvest," as it is called in Canada. There all is order and careful management,—for their maxim is, that "each good apple should be treated as a thin glass globe,"—and the orchards, with their heaps of best fruit colouring on the trees, are then a sight worth seeing; the workers working to the ring of hammers, as the apples, as they are picked, are placed in casks and headed in for exportation. This export trade is so large that the total arrivals last season from the United States and Canada were 866,097 barrels. Washington Market, in New York, was, we are told, "literally blocked with barrels filled with choice fruit;" and the same cry came from Philadelphia, Baltimore, Boston, and Montreal; so that, for many weeks, hardly a vessel left the Eastern seaboard without having a large consignment of American apples—

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such as Newtown Pippins, Spitzenburgs, Baldwins, and Greenings. From these cities 100,000 barrels were sent each week for several successive weeks: yet, on their arrival at Liverpool, Glasgow, and London, there was scarcely an apple bruised. So great is the profit the growers there make that their apples in this country ought to be sold cheaper, as, "in the Western and Southern States," says Dr. Nichols, "the finest apples cost less than three half-pence a bushel—less than a single good apple often costs in London." But the time may come when they will be, as the vast trade with America is yet in its infancy, and apples, like oranges, bear a long sea-voyage well. It is from Michigan, by the way, that the "Royal Favourite" comes, of which twenty barrels are sent to Windsor Castle each year, as they have been for the last thirty years.

But while the Americans can beat us in apples, we can still hold our own in pears, though many of our best ones are of such olden date. Thus that very old one, the October Bergamotte, dates as far back as the time of Julius Cæsar, and the Easter one from the reign of Elizabeth; the Summer Bon Chrétien was known to us in 1629, and the Early Beurré at the Restoration; the Angélique de Bordeaux was introduced in 1700, our Jargonelle and Vergouleuse in 1727, and the Chaumontelle in 1760, as was the delicious Doyenné d'Or. Miller's list too of that day includes, as amongst the best, the Black Pear of Worcester for cooking, and Lord Cheyne's pear for eating. The flavour, however, of much of our fruit depends on the time of gathering, and that time varies with sorts and situation. Thus, fruit in the Midland Counties does not ripen until a month after that in the Channel Islands, while that grown in Scotland is later still.

Fruit-growers, in planting different sorts, plant both late and early ones, so as to ensure for the markets a succession of crops—ranging from the Jargonelle in August to the Napoleon in November. Amongst these, the fine Seckle pear is of American origin, and the Louise Bonne grows best in Scotland. Many of the autumn pears will, with proper care, keep some time; but the real keepers are the winter ones, and these range from Crasanne in November, to the Winter Beurré in March; and when from Jersey—that very land of pears—the welcome Chaumontelles cease to come, three sorts will carry us on till June, the Easter Beurré, Beurré Rance, and the Josephine de Malines; when the end of that month will give us the small Saint Jean, and in July we have the Windsor. So that, if the grower knows his business, he can market pears all the year.

Fruit gathering, with us, begins in September, commencing with the early sorts of pot-fruit, and also such as are wanted for perry and cider; the former being used as soon as picked, and the latter being heaped together. The pot-fruit, however, is but of little account, as growers will not take the trouble to properly pack it, and it is, therefore, more often sent to the heap than it is to the county market. Where, however, choice sorts are grown and care is used, the apples, if for home use, are laid softly in a basket, taken from the orchard, and placed side by side in the fruit-room, where the light must be shut out and the frost prevented. If, on the contrary, they have to be sent for sale, (and they should all be picked before the end of October), they should be gathered when dry, handled gently, and packed softly in boxes or in baskets, wool or paper being placed under and over,

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and in between them. They will then reach the market safely; but the fruit that has been bruised by being poured from one basket to another had better be kept at home and added at once to the cider heap.

In September perry is made, and windfall cider for the workmen's drinking; and in October the regular "make" begins, and goes on at intervals until Christmas, as the apple-heap increases; all sorts of apples being in the heap, as the sweet counteracts the sour, and the good the bad ones. But for the making of best cider certain sorts are preferred, and those sorts differ with different counties, as also the method used; as, while some stick to the old stone mill, others prefer the nut-mill or the scratcher. The result in each case, though, is much the same, as from good fruit good drink comes, as we find when the cider beads well in the glass, and perry is pear-like and sparkling.—SHELSLEY BEAUCHAMP, in *The Squire* for October, 1881.

THE ORCHARDS OF HEREFORD AND WORCESTER.

THE following statements are extracted from a paper by Mr. Baron D. Webster, of Newland Court, Great Malvern :—

"Though differing in many other respects, these two contiguous counties are mostly reckoned as one as regards their fruit cultivation. Parts of Gloucestershire, Shropshire, and Warwickshire, which adjoin, are also included in this tract of orcharding.

"Nurserymen are fond of stating in their catalogues that apples do well in any soil. No doubt by such assertions they gain more orders, but it is a question whether the country has many more apples. Some are bold enough to add that a deep friable loam suits them best. No doubt of it; and most other things as well. It is quite certain, however, that the most important condition of the soil for the apple-tree is depth, and this, in the neighbourhood above referred to, it thoroughly enjoys. The formation of the country, too, affords numberless sheltered hills and sunny slopes, where fruit trees luxuriate as if in walled gardens.

"There is no doubt that Worcestershire was enclosed and highly farmed at a very early period, and the cultivation of apples and pears must have been energetically carried on from the first. Herefordshire produces, perhaps, the best apples, but very few pears. The latter fruit gives one the best idea of the antiquity of this sort of cultivation. The remaining trees in the celebrated Barland Perry Orchard at Monksfield Farm, near Malvern, are stated by one writer to be 600 years old. This is probably an exaggeration, but there are, doubtless, many trees scattered over a large area that must be several hundred years old. An apple-tree would hardly be of any use to the owner after a hundred years, but the pears above referred to are still, many of them, most valuable. The ground, however, seems tired of them—and no wonder—and the grafts taken from them do no good.

"Few Worcestershire homesteads are without a few of the "Early Jennet" trees, which still bear bountifully, though of an enormous age. This and other

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descriptions of the earliest pears ripen about August 1st, and in a good year help the farmer very much with his labour bill, so heavy at that time of the year. The fruit is shaken down by boys who climb into the trees with long hooked poles, and is picked up by women underneath. Sacks and cider cloths are spread underneath to break the fall of the fruit. These are the pears that are so constantly seen in the early autumn hawked about the streets.

"Hop and fruit cultivation often go hand in hand, the former demanding even more imperatively a deep soil. In the famous Teme Valley—one of the richest spots in England—the ground will grow hops for ever; where roots die there it is re-planted. On the uplands, however, it is found necessary to change the hop ground every twelve or fourteen years. The effect of hop growing on the soil, contrary to what one would suppose, is to render it almost as fertile for a renewal of general cropping as virgin soil. An old writer, indeed, drily remarks that 'the greatest profit in hop-growing is the breaking up of the soil afterwards.' Up to the present time, whenever hops are planted, an orchard is planted at the same time, as an economy of labour and ground. By the time the trees begin to be prejudicial to the hops, it is time to remove the latter altogether. Of course the field remained arable; but that used to be thought no hindrance to the orchard—or, rather, the orchard was thought no hindrance to the arable field. When it is considered how much finer the trees grow on an arable field, and that they are thus nearly always out of the way of cattle and horses, it will be seen that the disadvantages are compensated for. These are the spoiling of corn crops by the sun being kept from them (a trifling loss if the trees are not planted too closely), and the difficulty of cleaning the field when encumbered with trees. No difficulty exists as to ploughing, though a slight extra expense is entailed by the necessity of having three men or boys attending to the horses when the tree-rows are being ploughed out, and also of having the ground just round the trunks dug with the spade. This is well done by any labourer for a penny a tree.

"When orchards are planted in grass land it is much better to have the young tree dug round for several years. They require to be fenced in on grass land with great care and expense, and at the time of the ripe fruit everything must be kept out of the field. It is far better, when planting an orchard on the green, to stock it for the first few years with nothing but sheep and young cattle. Horses and full-grown cattle will knock over any fencing, unless made so strong as almost to interfere with the growth of the trees.

"The best and cheapest fencing for young trees is of this description—Plant firmly in the ground, in the shape of a triangle, three stout hop-poles (about as thick as a man's arm), and cut them off to about 4ft. or 5ft. high. They should stand about 1½ft. from the stock, and lean outwards. To these nail wire netting as high as a sheep can reach. You are then safe from sheep and game. If calves and young cattle are to be in the field, protect this wire netting again well with bushes fastened round with wire. If cattle and horses must come in, however, there is nothing for it but the old-fashioned heavy wooden cribs, which, besides being very cumbersome and expensive, are also very detrimental to the prosperity of the tree. Their great posts make holes for the wet to accumulate and lodge in

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during the winter, and cracks to let the draught through in the summer. Of course, in pruning, the object is to keep the branches growing outwards from a stem about 5ft. high.

"Some farmers, who are convinced of the profit of growing fruit, are so particular on these points that they get slightly eccentric, to say the least, and discharge their men for the slightest infringement of their rules. An apple-tree can hardly become very profitable under fifteen years' growth at least, and it certainly is most aggravating to have a tree, or perhaps an orchardful, seriously damaged by purely avoidable causes, after, perhaps, a most careful watch has been kept on them for ten or twelve years. After an orchard is once well started, the only expense connected with it is the pruning, and that is about covered by the sale of the 'brash.' Apple-trees in Worcestershire often attain the size of an ordinary oak, and a tree of good sort will bear 25 bushels of apples. One pear-tree will often make as much as 200 gallons of perry.

"It is very dangerous to lay down to grass an orchard that has hitherto been in tillage. It often causes all the trees to die. The ordinary one year's course of seeds does not seem to hurt them, but a two years' lea undoubtedly does. The decrease in the extent of orcharding and the inattention to fruit cultivation is very sad to see, and it will not be amiss for us to look into the reasons for it.

"First of all we have the enormous and grossly unfair profits taken by the 'middle-man.' A pot (5 pecks or 80 lb.) of fruit bought from a farmer for, say 10s., is not sold to the public under 20s. or 25s. The usual system is for the farmer to take his fruit to one of the merchants in Worcester, who sells it for him on commission, in reality to middle-men in large towns; so—at least so he is told—the merchant in paying the farmer always professes to be getting only 6d. or so per pot out of the matter.

"At the same time they carry on the business in other ways, buying fruit in large quantities on the trees or after being picked, and keeping it themselves as a speculation. A large farmer, with much business to transact, cannot be always personally looking after the sale of every load of fruit, and most of them usually sell it in this way. All that the farmer does not want to keep for the winter he sends in as fast as it is picked, and notes the quantity in a book, which is taken to the merchant, who signs it and adds the price he means to give for it, or sometimes the price he will give for the previous lot, this being still uncertain. The farmer can, if he is at any time dissatisfied, close up accounts; or, if he goes on all the year, can draw money as he wants it, sometimes drawing more than is due. At Christmas the book will be squared for the season. Sometimes the fruit is sold by auction on the trees, orchard by orchard. In the former way, of course, each individual lot of fruit is quite at the mercy of the merchant, and the farmer loses the full advantage of sudden and spasmodic rises in the market. On the other hand, he never has his fruit refused in a great flush. It is the profit made after the fruit has left the merchant and before it reaches the public that is so unfair. For instance, in one abundant year, when a pot of good fruit did not fetch more than 2s. in Worcester, enough to make an apple-tart cost 1s. 8d. at Malvern. A commodious fruit market has been built at Worcester, but it does not seem to work in

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any beneficial way to the large growers. Farmers give up the business in disgust at the unfairly low prices they get for their fruit.

"When a Herefordshire or Worcestershire farmer travels to Manchester or London in the vain hope of selling his large stock of splendid fruit, he is told that foreign fruit can be got so cheaply that he cannot be offered anything worth his acceptance. What is the consequence? The farmer goes home disgusted; five or six extra men hand-picking at 2s. 6d. a day are dismissed; and the fruit is either made into cider, or devoured by the sheep and pigs. At rent-day, when the farmer meets his landlord, he cannot pay all his rent, his farm being valued at perhaps 10s. per acre all round over its corn-growing value for the fruit that is supposed to be sold off it.

"Then as to labour. A few years ago there seemed no certainty at all as to where the demands of the agricultural labourer would stop, and the farmers all turned their attention to methods of making money without the need of labourers. Of course, to market a crop of fruit takes labour, and that of an expensive kind. Had the movement continued, the English labourer might soon have found himself out of employment altogether. And although wages were raised to the highest pitch five or six years ago, Worcestershire farmers have never since reduced them; still the attitude of the labourers caused terrible mischief, and has in these counties conduced to the present lamentable state of agricultural affairs.

"No greater mistake is being made than that of landowners in discouraging fruit cultivation, or perhaps, rather, not exerting themselves to extend and improve it. Every farm should be well inspected with regard to its fruit-growing capabilities. Orchards that are half-stocked with trees should be planted up, and kept planted up. Tenants should be bound to plant a new tree for each one that comes to an end. The green orchards—which are almost worn out—should be either entirely planted up, or entirely rooted out. A farmer is often losing weekly five pounds' worth of dairy or other produce for the sake of a pound's worth or so of fruit that is not fit to be gathered. An orchard should be well worth shutting up altogether when necessary, and by taking care no inconvenience will be occasioned. It is easy to eat down the orchards bare and let the open land grow up till the middle or end of August.

"Straggling trees all over the farm are a great nuisance on this account also. Cattle thus get a chance of tasting the fruit, and they often, especially in a dry season, get such a "hankering" after it that they cannot be safely confined in any field by any fence. A dairy of cows turned into a field of splendid keep, after being brought back from their "fruiting," will not put their heads down to eat for hours together.

"It is satisfactory to turn for a moment from the apple and pear cultivation of this district, which is certainly either at a standstill or going down hill, to that of plums, gooseberries, and currants, carried on so extensively in the neighbourhood of Pershore. Enormous plantations of the White Magnum Bonum, commonly called the Pershore or Egg plum, are there to be seen, and it is difficult to know where market-gardening ends and farming begins. One holding of 200 acres

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is entirely devoted to plums and gooseberries, with the exception of a few pears, and is well worth going a long way to see. On an average this garden is very profitable, but the losses some years are of course very great. It was planted by Mr. Varden, an engineer, who was employed in the construction of the Great Western Railway, and who was so much struck with the Pershore system of cultivation that he devoted himself to it on this scale. Since his death it has been bought by Mr. Bomford, who farms about 3000 acres besides.

"Along the Teme Valley are many valuable cherry orchards, some of which bring from £10 to £15 an acre annually to the farmer without expense on his part, the crop being sold on the trees by auction or otherwise. Cherries should invariably be planted together, and as thickly as possible, as it is necessary for some weeks before they are gathered to have a man living in the field to scare the birds.

"Damsons would be more cultivated were it not for the difficulty of getting women to pick them. A woman must work hard to pick a pot in a day, and there are fewer women to go to work now than formerly. Damsons fetch as much as 35s. per pot in some good years, and are always saleable on account of their being used for dyeing purposes. Plums here in a very abundant year can hardly be got rid of at all. Damsons, of course, do better on light soils, but they thrive well along with apples and pears."

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Woolhope Naturalists' Field Club.

1882.

THE annual meeting was held in the Woolhope Club Room on Thursday, April 13th.

The financial statement for 1881 was read.

A report of the progress of The Herefordshire Pomona was presented by Dr. Bull, together with the financial statement for part IV.

A petition against the total abolition of Vivisection was laid before the meeting.

The field meetings were fixed as follows :—

Thursday, May 25th, in conjunction with the Malvern Naturalists' Field Club, to visit The Golden Valley, for Arthur's Stone, and the Churches of the Valley including Dore Abbey.

Thursday, June 22nd—Coxwall Knoll and Brampton Bryan Park.

Tuesday, July 25th (Ladies' day)—Brecon, for the Brecon Beacons.

Tuesday, August 22nd—Ford Bridge, for Ivington Camp.

Thursday, October 5th—Hereford, for the Fungus Foray.

After dinner, at the Mitre Hotel, the president, Rev. A. Ley, read, as his retiring address, a paper on "Herefordshire Roses."

The following is the petition which was presented to the House of Commons, in accordance with the resolution passed at the annual meeting :—

"THIS petition, from the members of the Woolhope Naturalists' Field Club, Herefordshire, humbly showeth that your petitioners fully believe that the restrictions already imposed, by law, on the practice of vivisection, present serious difficulties to the progress of Science for the benefit of human and animal life.

"Your petitioners beg respectfully to remind you that in all country districts very painful vivisections on animals are continually performed, and are required as well for the safety and convenience of the public as for the profit of the breeders of animals and the producers of animal food; that the sports of hunting, shooting and fishing frequently cause great pains; and also that the furs, and feathers required for comfort and ornament, cause animals to be trapped and killed throughout the world, the feathers being frequently plucked from living birds. Now, since the production of all this widespread torture is by an almost unanimous voice agreed to be legitimate, your petitioners urge that the pain involved in

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scientific experiments, which, in comparison, are so very trifling in degree, must necessarily be legitimate also, whilst the objects gained by it are of high importance.

"Your petitioners, therefore, believe that to forbid the few experiments that may be required for scientific research, whilst sportsmen and society at large are to be left at liberty to carry on vivisection to so large an extent and in every locality, is indeed "to strain at a gnat and swallow a camel." Your petitioners for these reasons humbly entreat your honourable House to confine your efforts to stop, so far as may be, the infliction of all unnecessary pain on animals wherever it may be practised, and to leave science and society at large equally unfettered by a legislation that to ordinary common sense cannot fail to appear effeminate and sentimental."

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Woolhope Naturalists' Field Club.

ADDRESS BY THE RETIRING PRESIDENT, REV. A. LEY,

APRIL 13TH, 1882.

THE ROSES OF HEREFORDSHIRE.

IT becomes my pleasant duty to-day, in resigning my chair as your president to Mr. Thomas Blashill, to thank you heartily for the very pleasant year of office which you have accorded me ; and while asking your kind forgivenes for all the imperfections and faults the "office" has "betrayed in the man," to congratulate you upon the continued prosperity of the Woolhope Club. Like some generous Apple, far-famed as Ribston Pippin, our Club shows as yet no signs of that wearing out which *(pace* Dr. Bull) always happens at last to the best human things, if not to all things human. But our Club (witness the *Pomona*) is bringing forth abundant fruit in its age ; and so long as it continues to do plenty of honest work, so long will it flourish—like Charon, "cruda deo viridisque senectas."

My paper will have accomplished an object to-day, if it succeeds in showing you that there is likely to be no lack of work for us as a Club for some years to come.

You must pardon me for sticking closely by my last, and claiming your attention once more to-day for Botany ; and that, moreover, Botany in rather a narrow and restricted range. My choice in writing a retiring Address lay practically between cutting the flowers from the gardens of other scientific workers, and arranging them before you in a nosegay, not one beauty of which I could pretend to have reared myself, and introducing you to a region—though it be only one of briers—where I have myself been at work for some years past. My subject then is—"On the forms of Wild Rose, occurring in Herefordshire" ; and I bring my paper before you recommended solely on the plea that it represents the results of a good many hours' real work in the county for the past ten years.

The study of Roses is essentially a study of *varieties.* It is nothing more ; but it is nothing less. I say that it is "nothing less" because I do not think I need to defend, before a body of naturalists taking any deeper or broader views of natural phenomena, the study of variation, from a certain superficial contempt with which it is commonly treated by some observers. The luxuriance of variation observable in certain spots in nature (as for instance notably, in Botany, in the Bramble, Rose

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and Willow groups) combined with the strict definition seen in other spots, and even in some parts of these same groups, is in itself a remarkable thing. It has instructiveness and interest, as it has a beauty of its own; it opens before us questions and suggests to us principles in natural life, which we should be in danger of entirely overlooking, were all forms as distinctly marked from each other as those of Bell-flowers, Heaths or Sedges. The accurate and thoughtful study of these groups—these spots where the luxuriance of nature is at its greatest—may furnish a key to questions in natural Science of import far larger than their own narrow limits. At the same time for the naturalist who works on a lower level they have an especial attraction as opening before him a *multum in parvo*—a world of interesting research lying within very narrow limits. It is, therefore, essentially unphilosophical and practically unwise, to pass over these groups with the slighting observation that they are all forms of one or a few very variable species. Possibly so; but neither can you know whether it is so or not without long and accurate study of the group; neither if it turns out to be so in the end, does this make the forms in the slightest degree less worth study; and in the meantime you will have deepened and enriched your conceptions of the workings of life in nature, and of the meaning of the terms "species" and "variety," to a vast extent. You will have educated your eye and your mind (a truth I am sure all real workers in such groups will readily assent to) to perceive order when before was maze—to recognise unity and law, when at first all was confusion; unity and law all the more charming, because so hidden in luxuriance.

It may well be expected by you, that I shall remark at first that on such a subject as the knowledge of our Herefordshire Roses we have not yet approached finality. Even were the limits of the knowable approached in British Roses in general, our county contribution to that knowledge would have to be admitted to be very imperfect. Still enough has been observed in the county of Herefordshire to justify me in putting it before you in the shape of a paper on "Herefordshire Roses"; if only with a view to direct our botanists' attention to what still remains to be done.

The native forms of this genus are classed in the late Mr. Hewitt Watson's last edition of the "London Catalogue of British plants" under eleven species: and of these eleven, nine have been observed in Herefordshire. The two wanting, or rather not yet observed in the county, are the two rarest, and the two which shew the most restricted distribution in Britain; namely *R. hibernica Sm.*, which does not appear to extend south of Cheshire; and *R. sepium Thuill.*, a rare and somewhat obscure species, possessing however a distribution widely different from that of the last; the records of its observation being scattered from Northumberland to Hine Head. It is not therefore impossible that the discovery of this last may yet reward the industry of Herefordshire botanists.

It is possible that, upon first consideration of the foregoing statement, we might begin to congratulate ourselves upon shewing well in county Roses. But when we come to look into it, this impression vanishes. For the eleven species above mentioned are groups, more or less artificial, to classify some seventy

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distinguishable varieties—to which, in the constant onward march of botanical knowledge, some 6—10 more ought now to be added. And of these 70—80 forms, which of course constitute the real staple of our knowledge of British Roses, only 27—29 have as yet been observed in Herefordshire—that is, considerably less than half. Here is proof enough that the botanists of the county have as yet hardly earned a right to *talk*, but ought instead to put on their boots and scatter in every direction over Herefordshire woods and hedges and do some more work. However, as talking is the order of the day, I now proceed to talk about what has been done in the county in the genus *Rosa;* under the hope that such a review may facilitate the accomplishment of what yet *remains to be done.*

1. **Rosa spinosissima,** *L.* This Rose is a well known inhabitant of sand hills and sea cliffs; inland it is far rarer, and "mostly" Mr. Baker says "confined to limestone." Such being the case, its position and distribution in Herefordshire are singular; for it is nowhere found on the limestone, but is confined to the neighbourhood of Leominster, on the clay and cornstone of District 9. My specimens are contributed by the Rev. Thomas Hutchinson, of Kimbolton, from whom my whole knowledge of it as a Herefordshire plant is derived. He informs me that it is abundant in his neighbourhood. It re-appears on the mountain cliffs of the Llanthony valley, not however within the district of our county Flora, but at Taren r'Esgob in Breconshire, where in union with two other rare plants *Geranium sylvaticum* and *Hieracium prenanthoides,* it occupies a single spot upon the cliff.

2. **Rosa involuta,** *Sm. Var. b. Doniana.* Of this plant I can say very little. Its occurrence in Herefordshire rests upon the authority of Mr. E. Lees; who in his "Malvern Botany" locates it "near Cradley." I have no reason to doubt this statement; still I have never seen specimens; and, in a subject like that of Roses, in which our knowledge has advanced so rapidly of late years, information of 20 years' standing is somewhat out of date. I should be exceedingly glad of more recent information, and especially of specimens of this Rose. We ought to know something about its distribution, and its frequency or rarity, in its one chosen home at Cradley.

3. **Rosa mollissima,** *Willd.* This is a comparatively recent addition to our county; and indeed to the west and south-midland counties generally: Mr. Baker (the great authority in this genus) had not in 1869 seen it from any station further south than Derbyshire and Merioneth. It is however scattered in fair abundance over the hilly parts of Herefordshire, so far as I have botanised; but with markedly increasing frequency as a higher level above the sea is reached. Possibly it is altogether absent from the Wye Valley. I have it from Districts 1, 10, 12, 13, 14. It is plentiful and well marked upon the Llanthony hills, occupying both their valleys and the cliffs of the hill sides. It occurs again in fair plenty in my own neighbourhood, in the parishes of Garway, Saint Weonards, and Orcop; being especially frequent upon the poor soils of the latter parish.

4. **Rosa tomentosa,** *Sm.* A glance at the list of Districts will shew what a general distribution this Rose has:—1, 2, 3, 4, 5, 6, 7, — 9, 10, 11, 12, 13, 14. District 8 is no doubt left out from mere inobservancy. We may say that it

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comes next to *R. canina* in commonness, or at least disputes that place with *R. arvensis*. To both however it decidedly yields in abundance: *i.e.*, though you will find *R. tomentosa* in every parish, possibly on every farm, you will find 30 bushes of *arvensis*, and 100 of *canina* to one of *tomentosa*. When well grown, *R. tomentosa*, with its resinous-scented foliage and deep-tinted flowers, is a handsome and conspicuous Rose; but it exists also very frequently in cropped hedges without flowering, and is then very apt to be overlooked. We cannot at present lay claim to many of the named varieties. Either they are less markedly separate from each other than those of *canina*; or the infrequency of individuals in this Rose affords fewer opportunities of studying them. They form one of the points in which the knowledge of Herefordshire Roses is most imperfect, and will most repay careful investigation. One or two, however, of its varieties, having been lately named for me by Mr. Baker, may now be included in our lists.

Var. c. farinosa. A plant gathered by me at Aymestry last year is named thus, with a "?" by Mr. Baker. It was a peculiar plant, with barren shoots almost destitute of prickles; leaves quite resembling *mollissima;* and fruit naked.

Var. d. scabriuscula. This is a well-marked variety, and will I believe prove not rare in Herefordshire. I have it from several widely separated localities (Aymestry; Deerfold forest, Shucknell hill, Whitfield); and the plant from two of these was named "excellent *scabriuscula*," by Mr. Baker. A plant gathered by myself and Mr. Purchas, near Mordiford, in 1873, most probably also belongs to this variety; though in point of glandular development of the leaf it comes nearer to *var. e. sylvestris*; with which however it does not agree so well in other respects.

5. **Rosa rubiginosa,** *L.* The "Sweet-brier" has a large range in Herefordshire, if we make its records a criterion (1, 2, 3, 4, 6, 8, 10, 13); and yet at the same time it is one of the least satisfactory of all our forms. Two doubts arise when reading these records; and they are doubts not to be set aside: one, whether the recorders knew it from *R. micrantha*; and the other, whether, supposing the species to be "true," it is a Native, or bird-sown from some neighbouring garden. I have gathered it at the "Common hill," Fownhope; at Shucknell hill; at Aconbury; and at Breinton. In none of these stations can I affirm with certainty its native character. It is nearly always near houses; and is not to be found in the thickets or remote hedges, where it *should* make an appearance if a true Native. It is most like a native plant at Breinton of all its Herefordshire stations; for here several large bushes grow in a steep roughet overhanging the river. It occurs also in a broad old hedge near Breinton Common, where of course it is likely enough to have been planted.

6. **Rosa micrantha,** *Sm.* The genus *Rosa* affords one of the few instances in which the *nose* (in the human animal) is the surest guide he has to accurate knowledge. The Roses in the Sweet-brier Group, with the well-known and peculiar fragrance from which they derive their name, can always be told with accuracy from those of the *tomentosa* Group; and these, again, with their peculiar resinous scent, from those of the *canina* Group—by the help of the nose!; and this more

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easily and certainly than by the eye. In all other characters except scent (in which it is often, in Herefordshire, as sweet as Sweet-brier itself) *R. micrantha* stands half-way between Sweet-brier and Dog Rose. It is, I believe, more common in Herefordshire than its recorded distribution would indicate (1, 2, 3, 4, 6, 7, 9, 11). It is seldom, perhaps, absent from the hedges of any farm, if carefully searched; and possibly stands next to *R. tomentosa* in generality of distribution.

7. We now come to the really *great* species of the genus in *Rosa*: **canina**, *L.* It is the most common of all. It shares with some other ubiquitous species, (and with the animal after which it is named) the character of exhibiting a multiplicity of forms. Besides its commonness, it is also far and away the most abundant of all the species in individuals. It varies but little in armature; greatly in clothing and glandular development. Taken as an aggregate, it seems to be nearly equally abundant throughout Great Britain. Taken in the segregate, one peculiarity of its distribution in Herefordshire is the paucity of its glandular forms. These, however, are not totally absent, but occur very sparingly. As one goes northward, these glandular *caninæ* increase in frequency, and in development; until in the north of England they become a very marked part of the aggregate species. Its abundance in individual plants is well illustrated by the fact that its three most common forms, *lutetiana*, *dumalis*, and *urbica* (with intermediates), which in Herefordshire make up, perhaps, $\frac{49}{50}$ of all the *species canina*, make up also a good half or possibly two-thirds of *all the Rose bushes* in the county of Hereford.

I now pass on to note its separate varieties, as found with us.

(a) **Lutetiana.** This varies greatly in the shape, colouring, and angle of its leaflets, which are typically narrow and keeled; and in their toothing. This latter *should be* sharp and simple; but, as a matter of fact, is seldom found quite simple; never, I believe, with the simple open serration characteristic of *urbica*; often the leaflet is so irregularly as to become almost *doubly* serrate. On the other hand, I believe that it is always *sharp* (like the teeth of a hand-saw, in distinction from those of a cross-cut saw). In this point of the irregular serration, as well as in the point of the numbers of blossoms in a cluster, *lutetiana* passes without any assignable break into

(b) **Surculosa.** This, as an extreme or well-marked form, is not at all common in Herefordshire. I have just said that I can assign no limits between this and the last; and there is scarcely a hedge in the county, which will not produce a luxuriant young bush, or spray from a bush, of *lutetiana* which might well pass for *surculosa*. Occasionally, however, I have met with its characteristics (strong *surculi*, irregular serration, and numerous flowers in a cluster) produced in combination, and in such marked prominence, as to preclude the doubt that we have as "good" *surculosa* as any which the midland counties produce. I have it from at least three or four widely separated spots; two of these, (Orcop and Llangarren) being localities in which it had been already observed by Rev. W. H. Purchas, some years ago.

(c) **Sphærica.** Rare. I have plants which I think must be assigned to this variety from two localities; Breinton, in District 7, and Perrystone in District 2.

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(d) **Senticosa.** This again is one of the rarer of our forms. It is a weak straggling wood plant, which is either rare in Britain, or often passed over as not worth notice. In Herefordshire it has only been gathered in the Lord's wood, Great Doward.

(e) **Dumalis.** This variety is quite as abundant as *lutetiana*; and might well be reckoned more abundant, were not the question rendered an idle one by the impossibility of fixing upon a limit at which one begins and the other ends. "Good" *dumalis* (with regular doubly serrate leaves and glandular petiole) has, occasionally, glands spreading to the midrib, and even the secondary veins of the under surface, and assumes the aspect of some of the *Sub-rubiginosæ*. This leads into

(f) **Biserrata**; which can hardly be assigned any more independent position than that of exaggerated *dumalis*. As an extreme form, however, it occurs in several spots in Herefordshire, (first recorded by Mr. Purchas, from the Upper Cleave, Ross, upon specimens verified by Mr. Baker; then, by myself, from Allensmore, Orcop, and Saint Weonards) though in far greater rarity than ordinary *dumalis*.

(g) **Urbica.** This Rose stands in a position of considerable independence in relation to the five above enumerated; and is in its turn the chief of another group of three or four. *Urbica* is with us the third in frequency of the varieties of *R. canina*; but it is, as at present defined, a name which covers two or three separate forms. What I take to be "typical" *urbica* is a plant with light grey-green leaves, the leaflets flat and broad, with extremely regular, very open, and perfectly simple serration. These characters are often so marked as to give it a facies which stamps it to be (as Roses go) quite distinct from any of the foregoing. But other plants occur, possessing leaves which, except for their clothing of hair, might belong to *lutetiana*; and especially with the sharp, narrow, and unequal serration characteristic of that plant, yet which seem included under this name. We have also (from the Grwyne Valley) another plant exactly answering to the description of *R. platyphylla*, Rau., as quoted by Mr. Archer Briggs (*Flora of Plymouth*, p. 137); "a very luxuriant plant, with remarkably large glaucous leaves, slightly doubly serrated, the serratures terminating in a peculiarly stiff hard point; stipules and bracts fringed with glands; fruit nearly, or quite globose." This surely deserves a separate letter.

(h) **Frondosa.** This again is very near *urbica*; not, perhaps, differing more from *urbica* than the various forms included under that name differ from each other. It is a small and neat leaved variety, the shape and serration of the leaves exactly that of typical *urbica*, with small round fruit. It appears to be fairly plentiful in Herefordshire; it occurs at Welsh Newton, and in the parish of Saint Weonards; also in the parish of Clehonger; and at Backney, near Ross (W. H. Purchas).

(h)* **Obtusifolia.** Too close, perhaps, to the last to merit a separate letter. But the fruit is generally larger, and less round; the leaves more hairy, though quite similar in shape and serration. This Rose is abundant and widely

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spread over our county; ranking, I think, next to *urbica* to form the *fourth* in commonness among the varieties of *canina*. As far as I have observed, it is not confined to any one soil or situation. This and the last agree in having the styles commonly agglutinated, so as to form a column more or less projecting, similar to that in *R. arvensis*, though not so conspicuous.

(i) **Arvatica.** This, as one of the glandular forms, is quite rare in our county, though it is frequent in the north of England. From Herefordshire I have a specimen gathered at Hoarwithy by Mr. B. M. Watkins, but I never gathered it myself in the County, till last year, when I met with it at a second station, on the Maes-coeds above Peterchurch, and at a third station in Orcop.

(j) **Dumetorum.** Fairly common in Herefordshire; but not common in a typical state. In our county it often runs so near to *urbica* as to leave one in perplexity to which variety a bush is to be assigned. Again, other bushes will have leaves of "good" *dumetorum*, but fruit which would stand for *dumalis* or *lutetiana* just as well. When both leaves and fruit possess the large fine character which marks *dumetorum*, it becomes a very fine and distinct Rose.

(m) **Tomentella.** This neat and distinct variety is either wanting, or at least quite rare, on the light soils of Herefordshire; but appears to become much more common upon the heavy clay lands. I have gathered it at Marcle, and near Allensmore; and recently in abundance at Weston Beggard. I have a specimen gathered by Mr. Burton Watkins at Hoarwithy; but I never, myself, met with it in the Ross neighbourhood, nor in any part of the south of the county.

(n) **Andegavensis.** We here enter upon a set of varieties of *R. canina* bearing aciculate peduncles. This, the first of them, can scarcely be said to exist apart from *lutetiana;* the only character separating them being the peduncular *aciculi;* and these are often very weak and slightly developed. It is scattered and not uncommon, so far as I have noticed, all over the county.

(o) **Verticillacantha.** This, as appears to me, is far more distinctly marked from *dumalis* than *andegavensis* is from *lutetiana*. It seems to be common in many parts; but in Herefordshire (like the other glandular varieties) is of extreme rarity. Indeed we have no positive evidence yet of its occurring in *Herefordshire proper;* but I have gathered it in the Llanthony valley, within the limits of our Flora; and it occurs again abundantly round Malvern, on the Worcestershire side of the hills. Thus it occupies the extreme west and east flanks of the county. Round Malvern it often puts on the extreme clothing of *aciculi*, by virtue of which it becomes the *R. aspernata* of Deséglise. It is, in this state, a very marked Rose. I have gathered it in this state myself at Malvern, and have received beautiful specimens gathered in the same neighbourhood by Mr. R. F. Towndrow. I trust that it will be found to occur on the Herefordshire as well as the Worcestershire side of the hills.

(p) **Collina,** *Jacq.* (Kosciniana, *Besser*). This is not an abundant form in Herefordshire; and I must confess to knowing little about it. Specimens (which appear poorly marked) from several stations in Districts 1 and 2, have been communicated to me by Mr. Burton Watkins. Others, much better marked,

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I gathered at Orcop last year, and submitted to Mr. Baker's judgment: and Mr. Purchas reports well marked plants of this variety from near Backney and from the Doward.

(q) **Cæsia.** This Rose is a recent, and very interesting addition to our County Flora, due to the diligence of Mr. Towndrow. The neighbourhood of Malvern seems to rejoice in an abundant and interesting set of Roses, which Mr. Towndrow is now working. Among them is one upon which Mr. J. G. Baker writes as follows: "The Rose does excellently well for a form of Smith's *cæsia*. . . . I have seldom seen the figure in English Botany so well illustrated. I am glad to hear that the plant is not unfrequent, as it is an old type, very little known." Mr. Towndrow's specimens communicated to me are from Cowleigh park, and Colwall in Herefordshire.

(s) **Decipiens.** I place this Rose upon our list on the faith of Mr. J. G. Baker, who so named for me a Rose picked near Eaton Bishop in 1874. At the same time, I must confess to being dissatisfied with the name, and should myself assign a place to the Rose among the varieties of *tomentosa*. It was confined to single bush, unfortunately since destroyed.

We come now to a set of varieties of *R. canina*, the *Sub-cristatæ*, in which the calyx-segments, instead of becoming reflexed and dropping before the fruit ripens, rise over the fruit and become erect as it grows, and are persistent until it has turned colour; ultimately, however, falling before it softens. This habit gives a very peculiar aspect to the plants of this Section; and the credit of first giving due prominence to this peculiarity as a basis of classification is due to Mr. J. G. Baker, whose admirable monograph of the British forms of this genus has done so much to render its study easier to younger Botanists. It is only to repeat what every student of plants knows, to remark that, prominent and well marked as this character is, it yet fails to give in every *individual* instance an available criterion of difference. Mr. Purchas tells me that intermediates between *R. sub-cristata* and ordinary *dumalis*, to which even Mr. Baker hesitates to assign a name, are common in his neighbourhood: and the same is undoubtedly true in Herefordshire. These stubborn individuals (the *cruces* of systematisers, but the delight of observers) teach us more about the secrets of nature than 100 which we can complacently label and put in their respective places.

I do not know that we can select any other points in these Sub-cristate plants, in which, as a group, they exhibit marked differences of habit from ordinary *canina*. They are decidedly more rare in Herefordshire than the first group; by possibly 500 to 1, or probably some still more unequal proportion. In North Staffordshire, and the Peak of Derbyshire, Mr. Purchas informs me, they are on the contrary the most frequent. We possess two, or perhaps three of the forms.

(t) **Reuteri.** This fine Rose is rather rare, but at the same time widely distributed in Herefordshire; I have gathered it in many spots in the Central, Southern and Western Districts.

(u) **Sub-cristata.** The remarks upon the last apply equally to the present variety.

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(x) **Coriifolia.** One native specimen only of this, and that still *sub judice* as to whether it is to be claimed by Herefordshire or Monmouthshire, exists. It was gathered some years ago by Mr. Burton Watkins just on the borders of the two counties; and the exact bush is now destroyed or unknown. This Rose is a common and well marked form in the northern and north midland counties: and it is curious to notice, that though becoming extremely rare, it does not altogether disappear from south England. It is given by Mr. Archer Briggs at a single station in the neighbourhood of Plymouth. It occupies, similarly, a single known station in the counties of Hereford and Monmouth.

The following remark by Mr. Purchas as to its habit of growth in North Staffordshire, where it is very common, I can confirm from my own observation. "The general growth of *R. coriifolia* much resembles that of *mollissima;* so much so that, at the season when neither leaves nor fruit are present, it would be difficult to distinguish these two, were it not for their prickles. The stems are stiff and erect; the branches 12 to 18 inches long; not arching, as in ordinary *canina*. Like *mollissima*, it grows in colonies; a mode of growth due to the fact that the suckers from which new stems arise are shorter than in ordinary *canina*. Moreover, the internodes are very short; and the stem has the deep vinous purple which marks *R. mollissima*."

With regard to the *Sub-cristatæ* generally, I may add that, not only are they much less frequent in Herefordshire than in the north of England, but they seem also *less distinct* from ordinary *canina*. Botanising in the north of England, you know them at a glance; and their assurgent and persistent sepals give them a character which, *primâ facie*, would make you hesitate in assigning them to the same species as the e-cristate forms of *canina*. In Herefordshire, on the contrary, they are often only one degree removed from ordinary *lutetiana* and *dumalis;* the sepals being in the greater number of cases only partially persistent and assurgent; often, moreover, these characters are oddly inconstant on the same bush, and even the same fruit; on which you may find one turning up and sticking on; two falling off as ordinary well behaved *caninæ* should; while the two remaining ones have not quite made up their minds. It is thus quite common to come across bushes which it is impossible to assign, with certainty, to the E-cristate or Sub-cristate divisions. Yet, again, we have in Herefordshire, although rarely, as "good" *Reuteri and sub-cristata* as any in Yorkshire or Cumberland.

This brings us to the end of the varieties of this many headed Cerberus, *Rosa canina*, so far as Herefordshire is concerned. A third section of its endless forms, the Sub-rubiginosæ, in which the glandular development of the leaves is such as to mimic the Sweet-brier Group, is unrepresented in Herefordshire by a single form.

8. **Rosa stylosa,** *Desv.* **var. a. systyla.** Upon this Rose I can give no information, I can but ask for information. It is given by Mr. Lees (Malvern Botany), for two stations in the Ledbury District. There is no doubt that these records are right; especially as Mr. Towndrow finds the Rose on the Worcestershire side of the hills. Still, as in the case of *R. Doniana*, a Rose-record of 20 years standing stands in need of re-verification; and recent and fuller records of this plant, accompanied by specimens, are highly to be wished.

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9. **Rosa arvensis**, *Huds.* Probably the most common Rose of Herefordshire, next after *R. canina*; and certainly the most abundant. It is curious to notice how much less subject to variation this ubiquitous plant is than *R. canina*. It is among the least liable to multiformity of any British Roses. Throughout the county it is almost uniform.

The **Var. b. bibracteata** I have never succeeded in finding in Herefordshire; but a curious state, which I have not seen noticed in books, is sometimes found, in which the sepals turn up and are persistent, much after the manner of the Sub-cristate varieties of *R. canina*.

I wish to record, in conclusion, my obligations to Mr. J. G. Baker, of Kew, to whose judgment county specimens of nearly every variety mentioned in the foregoing paper have been submitted. If my personal obligations, and I may add our county obligations, to this gentleman's courtesy have been great, the obligations of every student of Wild Roses, to his admirable Monograph, are still greater. Without it, no botanist could now hope to work successfully in this genus. To say that it is not perfect, is only to say that the knowledge of British Roses has (almost entirely through its means) progressed since 1869, when it was published—a statement which Mr. Baker himself would be the first to acknowledge. Criticisms of different details in its divisions would be, no doubt, easy; and some such have been suggested in the foregoing pages. Still the Monograph as a whole is admirable; and it is only on the basis of the knowledge furnished by the Monograph itself that such details of criticism could be based.

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Woolhope Naturalists' Field Club.

MAY 25TH, 1882.

THE true lover of Nature will woo her in every mood and phase, so it was a just instinct that selected for the first field meeting of the present season a wet Thursday in May—and, when, on the morning of the 25th the soft whisper of the falling rain and the measured drip from the eaves were punctually heard on turf, and tree, and balcony (what time the intending holiday-maker, losing heart and hope, turns off to sulky sleep), our naturalists, welcoming the music, sprang up as to the early bugle call.

It was a joint meeting of the Woolhope and the Malvern Naturalists' Field Clubs, in the Golden Valley, which, by its new railway, has but recently been made easy of access, and the following members and visitors left the Barr's Court Station by the 9-40 train for Pontrilas, or else joined the party later in the day :— Mr. Thomas Blashill, president of the Woolhope Club; Mr. G. H. Piper, President of the Malvern Club; the Rev. J. D. la Touche, President of the Caradoc Club, with four friends; Revs. Sir G. Cornewall, A. W. Horton, C. Burrough, R. H. Warner, R. H. Williams, W. Jellicorse, A. Ley, F. S. Stooke-Vaughan, G. M. Metcalfe, W. Bowell, J. Barker, G. M. Custance and friend, A. G. Jones, D. Price and C. Bannister, Dr. Bull, and Messrs. J. Riley, J. Tom Burgess, H. Vevers, H. H. Wood, J. Carless, H. C. Moore, J. W. Lloyd, C. Fortey, — Hall, O. E. Creswell, A. Purchas, John Lambe, W. D. Robotham, H. Haywood (Moccas), J. S. Haywood, T. Salwey, Edwin Lees, J. J. Reynolds, Edward Goodwin, F. R. Kempson, Bernard Denadine, — Dawson, E. A. Taunton, Mr. Borton (of Christchurch, New Zealand), and Mr. Theo. Lane (Secretary).

You enter the district of Pontrilas, and the train, first winding round a wooded hill, takes a pretty straight course for some ten miles, to its termination near the head of the valley at Dorstone. It is a district enclosed between two ranges of somewhat bold hills, broken up by lateral valleys. A good breadth of tillage land slopes down from the woods to the bottom of the Golden Valley, where flat meadows extend in breadth for half a mile or more. Here, the river Dore, alive with lusty trout, winds and rushes, and sometimes even falls in its haste to join the Monnow, below Pontrilas. Now we can gain some notion of the day's business. Now Dore Abbey, mutilated indeed, but still massive, looms out in sombre gray, amidst the gladsome greenery of the drenched trees. Yonder is the ivy-mantled Tower of Bacton, where Blanche Parry, done in alabaster, stands

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for ever in attendance on her alabaster queen. And here are the "waterworks," or cuts, some miles in length, made by sanguine Rowland Vaughan, to control the vagaries of the river. Next, Vowchurch, where every blade and spray is rejoicing in the welcome moisture, and waving towards Heaven for more. And here is Peterchurch, amongst its meadows, knee-deep in verdure. Surely, from its luxuriance, this was well-named the Golden Valley! Roscoe has said of it: "The far-famed Golden Valley, gay with yellow flowers, well deserves such a fairy-tale name"; but now an archæologist at our elbow reminds us that the ancient British name for the river was Dwr—water—the root of all such river names as the English Derwent, the French Adour, the Peninsular Douro, and the Italian Dora. So "Dyffryn Dwr," the valley of water, was easily transformed by the monks into Val d'Or, which thus became the Golden Valley of to-day. Never mind—it is a real Golden Valley, and just now a valley of water, none the less.

At Dorstone, the party was received by the Rev. Thomas Powell, the rector, whose little "Guide to the Golden Valley" was already in the hands of most of them. He had, with great kindness, made the needful arrangements for the earlier part of the day, and for the benefit of such as might find it difficult to climb up to Arthur's Stone, some of the neighbours most kindly sent a supply of saddle horses—handsome and useful animals, that did their duty cleverly. The first visit was made to the Church, which, as Mr. Powell pointed out, had been partly rebuilt, some fifty years since. He gave an account of the finding of an inscribed stone, commemorating the foundation of a chantry chapel on the north side of the chancel by Ricardus de Brito, one of the murderers of Thomas à Beckett, who, with his three companions, is believed to have lived in penitence on the Black Mountain, not far from this spot: a few relics of the structure, dedicated to St. Faith, A. D. 1171, had been preserved. Mr. Blashill observed, in confirmation of the probability of the story, that the Augustinian priory of Woolspring, near Weston-super-Mare was founded by Tracy, another of the murderers. But the stone now in question is lost, as well as the copies taken from it, so the story, though thus well verified, passes to the somewhat easy custody of tradition—a thing to be regretted. The Church still contains a very handsome piscina, a portion of its oak rood-loft, and some other remains of the fifteenth and sixteenth centuries. The school was next visited, and an account given of its endowment, with certain property in London, diminished in value to this day by the great fire of 1666. Still it seemed to be doing its work bravely upon a nice little assemblage of children, who remained as still as mice, and one could not help wishing them joy of the widened prospects which must result from the closer union of their Valley with the world beyond. Passing across the Village Green, where the ancient cross now carries a sundial (the temporal is so much nearer to us than the eternal!) a start was made for "Arthur's Stone." After a stiff climb of half-an-hour this massive relic of pre-historic times was reached, and Mr. Piper read a paper giving the most likely conjectures as to its origin and use, as well as the old accounts of its condition. A broad table, some 18 feet long, stands on rude upright slabs, and other stones lie around, one large stone lying solitary, several yards away. Its ancient name of "Thor Stein," seems to have

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given rise, first to the name of the parish of Dorstone—which some prefer to think arose from the river Dore—and next to the fancied connection of King Arthur with this place. Mr. Piper concluded with an account of the melancholy visit of Charles I. to this spot, on his vacillating journey from Monmouth to Hereford, and a short description of the geology of the neighbourhood.

During the address, the Rev. E. Stooke-Vaughan and Mr. Salwey were busy (as elsewhere during the day) photographing the objects of interest—a most useful way of fixing their appearance for future reference.

The mounted members of the party next made for Meerbage Point, whence a view of the landscape extending to several counties can be obtained.

The geology of the excursion was, however, altogether marred by the persistent rain, and the botany would have been, but for the enthusiasm of some of the visitors. The walls at Dorstone were at once seen, from beneath the umbrellas, to form a locality for *Cotyledon umbilicus*, wall Pennywort or Navelwort, an interesting and not inelegant plant, with virtues, moreover, for the cure of corns. Can this be the reason the natives walk so well? One member brought the *Nasturtium amphibium*, Great Water Rocket, or Amphibious Cress, which he had gathered by Bredwardine Bridge. *Geranium lucidum*, shining Crane's bill, was gathered on the stones, at Meerbage point. *Equisetum umbrosum*, the dense Horsetail, was gathered at the Golden Well, and *Moenchia erecta* was also fouud; and all these plants are rare in Herefordshire.

Mr. J. S. Haywood, honorary secretary of the Worcestershire Field Club, (who has always a happy knack of carrying about with him something of much interest appropriate to the occasion), brought with him *Helleborous viridis*, Green Hellebore; *Geranium Phœum*, dusky Crane's bill; *Lathræa squamaria*, Greater Toothwort, a parasite on the roots of Hazel and some other trees; and some fine specimens of the Great Leopard's Bane, *Doronicum pardalianches*, so named from its roots having formerly been used to destroy wild beasts. This last-named plant, Leopard's Bane, was particularly appropriate, since a well-known station for it formerly existed in this Valley, a mile out of Peterchurch, on the Hereford-road. Some ruthless roadman, however, levelled the "tump" it grew upon, and its golden blossoms were no longer there to gladden the mind of the passer-by. The unhappy man, doubtless, did it in ignorance, or the dire malediction of Science would rest on him for ever hereafter.

Assembled at the Pandy Inn (Pandee—a tannery—we are in the midst of old Welsh memories), with appetites sharpened by the journey and the weather, such a dinner was waiting that showed that the resources of the Golden Valley are quite equal to entertaining all the visitors it can reasonably expect. Dr. Bull then made some announcements relating to the Woolhope Club, referring particularly to the loss it had recently sustained, by the death of Mr. T. Curley, a good practical geologist, and a member of the Central Committee. Mr. Curley has left to the Club a valuable collection of portraits—photographs—of the leading scientific men, ready framed, for the Club Room at the Free Library, and his scientific books. It was also announced that the next meeting of the Club, for Coxwall Knoll and Brampton Bryan Park, would be held on Tuesday,

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June 20th, instead of on Thursday, June 22nd, which happens to be Brampton Bryan Fair.

Thanks having been duly offered to the Rev. T. Powell and Mr. Piper, Mr. Powell gave some interesting extracts from Rowland Vaughan's account of his "Most approved and long experienced Water Works," which, far from being limited to statistics of the ditches which had been seen between Bacton and Peterchurch, deals with the social condition of the Valley. The account is extremely curious and often amusing, and not less curious is the scheme, which this scion of the Vaughans of Bredwardine thought suitable for the amendment of things as he found them there. The copy of the book, which is extremely rare, was lent by Mr. H. Vevers, and it is to be hoped that it may be reprinted at no distant day.

At 2-30 a start was made, by special train, for Peterchurch, and now occurred the only hitch in the arrangements. The rain, that had on the whole held out very well so far, began to fail, and soon entirely ceased. Not that it was of much consequence, for the remainder of the day was chiefly spent under cover, and it is remarkable, as showing the foresight of the ancients, that all the villages hereabouts were built, and all the churches founded, within a bow shot of the predestined sites of the railway stations—an example which the founders of some cities might very well have copied. At Peterchurch the Rev. T. Prosser Powell received the party, pointing out particularly the ancient altar slab, with its five consecration crosses. The Rev. G. M. Metcalfe read a very interesting history of the Church, which is worthy of permanent record—omitting in it, by the way, to detail his own great exertions in the work of its restoration. This is truly a noble building in all respects, having, like the neighbouring churches of Kilpeck and Moccas, the rounded sanctuary beyond the chancel, but also a second chancel (perhaps originally a central tower) which joins the east end of the nave, and besides this a more modern tower, of great massiveness, and a most graceful spire. An old, but still vigorous Yew tree, of the great girth of thirty feet, was observed in the churchyard.

The Church of Vowchurch has some traces of Norman work, chiefly in the small windows of the period. Tufa was used in some portions of the walls, as we have seen also in the apse at Moccas. It was found locally in small quantities, and, from its durability and easy working, was generally exhausted in early times. The great feature of Vowchurch is the timber construction of its tower, and the support of its roof. Huge oak posts were in the 17th century erected inside the walls, regardless of the windows and other features, and on these the roof was erected; a mode of construction not to be held up for copy, but involving some curious motives, not easily to be guessed at now. In the little Church of Turnastone, three or four hundred yards away, the first feature of interest is the oaken porch, an extremely plain but effective piece of construction. Within the Church there is a fine incised alabaster slab—a somewhat uncommon feature—an example of which may be seen at Westhide, near Hereford. The single-light windows are of good proportion, and most of them retain the ancient hooks for shutters or casements. One heard, of course, the tradition of the erection of these

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Churches, by two sisters: such traditions are incentives to the discovery of their real history. "Sister" Churches are not uncommon; at Willingales in Essex there are a pair in the same churchyard.

At Abbey Dore the Rev. Alfred Phillipps received the party. He had caused some search to be made for the remains of the destroyed building before the arrival of the visitors. Mr. Blashill described the Abbey, (dedicated to the Virgin Mary, and built in the reign of King Stephen by Robert, Earl of Ferrars, and Lord of Ewias) pointing out how the Cistercian or White Monks, arose in Burgundy in 1098, and were introduced into this country in 1128, this Abbey having been founded soon afterwards. It seems certain that their first Church, if not their whole establishment, was afterwards rebuilt, the present fabric dating from late in the reign of Henry II., as the pointed arches and extremely interesting transitional carving indicate. A very remarkable letter from the young Prince Arthur, elder brother of Henry VIII., shows that great abuses had arisen in the Abbey, and asks help for the new Abbot, who desired to effect reform. But soon followed the dissolution and ruin of the building, with its subsequent restoration by Lord Scudamore, a sketch of whose life and good deeds is recorded with so much interest in the second part of *The Herefordshire Pomona*. The tomb of Serjeant Hoskyns, another worthy, was inspected, and some one referred to his having amused King James I, by a morris dance of ten persons, whose united ages averaged 1000 years. The man or woman, who will believe that, will no doubt believe anything. They will believe the inscription on the tombstone of a former inhabitant of this parish, which gives the age as 141, the true age being doubtless 4. Mr. Blashill, in conclusion, ventured the heretical opinion that the tower, which the histories say was built by Scudamore, was really built in the fifteenth century by the monks of Dore. A marble slab on the wall is placed to the memory of Duncumb, the historian of Herefordshire. In the aisle, at the back of the altar, are recumbent figures of two Knights, arrayed in armour, supposed to represent Robert de Ewias, the founder of the Abbey, and Sir Roger Clifford, (the younger) who were both buried here. The altar is formed of a stone slab, fourteen feet long, which had been removed, after the dissolution of the monastery, and for many years had been used at a farm-house as a salting stone. Before leaving the Abbey some very handsome Communion plate was shown, the gift of Lord Viscount Scudamore after he became possessed of the Abbey Dore estate.

Mr. Phillipps very hospitably entertained the visitors to afternoon tea before they started for the beautiful walk over Ewyas Harold Common to Pontrilas. As the hill was topped, the slanting rays of the evening sun lit up such a glory of bright furze as will not soon be forgotten. Had we been a party of pleasure, how we should have revelled in it, and in the lovely scenery that encircles the spot! The Golden Valley and Vale of Dulas, with Ewyas Harold nestling in the wooded bottom, beyond Rowlston, the striking outline of the Skyrrid or Holy Mountain, and nearer, the hills of Garway, the Saddle Bow and Aconbury, with many lesser points of interest, all combined to justify the praises that have been given to this scene. Diligent search was made on the slopes of the hill for the

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Bee Orchis, *Ophrys apifera*, by the botanists present, but it was too early for the blossom, and it could not be found. *Chlora perfoliata* was there in leaf, and the green-winged orchis, *Orchis Morio*, in abundance, varying in colour from purple to clear pink and white. Looking back over our route, and around us within the compass of a few miles, we recognise traces of all the factions of men that have lived and struggled in this border land. We have said nothing of the chain of early forts that ran down the Valley from Clifford to Ewyas Harold, of Clifford Castle and Snodhill, and beyond the Valley, Skenfrith and Grosmont, and the home of the Knights Templars and Hospitallers at Garway. Surely one may remember when rambling over such ground that "those ever-springing flowers and ever-flowing streams have been dyed by the deep colours of human endeavour, valour, and virtue."

And presently we arrive at Pontrilas, in good time for the train to Hereford. The weather was very wet all the early part of the day, but it was yet a pleasant excursion, and every one, notwithstanding, seemed to have enjoyed their visit to the Golden Valley.

PETERCHURCH AND ITS HISTORY.

The following interesting paper on the history of Peterchurch, the "Metropolis," as it may be termed, of the Golden Valley, was read by the Rev. G. M. Metcalfe, who, for some years, was curate-in-charge of the parish :—

Twenty years ago (when I had already become strongly attached to Peterchurch and its surroundings) I endeavoured to find out if any historical account of this old Church or of the neighbourhood existed, but I found none. Talking one day, however, to a well-known good old lady, who kept the then village shop at Peterchurch, she informed me that she had once seen an old book as she put it, called "Roger Vaughan on Waterwork," and that this book showed that Peterchurch had once been a place of repute. What became of this particular volume my old friend could not tell, nor could I discover any one else who had ever even heard of it. Some years afterwards a happy thought struck me, and I mentioned this book to a cousin of mine, the present Senior Fellow of Lincoln College, Oxford, and after a persevering hunt in the Bodleian Library he pounced upon a small quarto volume containing "The manure of winter and summer draining of meadow and pasture by the advantage of the least rivers, brooke, forest, or waterprille adjacent, thereby to make those grounds (especially if they be drye) more fertile ten for one. Also a demonstration of a project for the great benefit of the Commonwealth generally, but of Herefordshire especially, by Rowland Vaughan, Esq., London, 1610." And here then was the book, a copy of which had once been in the hands of my old friend of the shop. And I will now, before speaking more directly of the Church, at Peterchurch, preface my few remarks thereon, by a few extracts from this quaint little work, referring as they

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do to this very part of the country—evidently to part of Peterchurch itself. The title of Vaughan's book is preceded by several bits of verse in praise of the author by his friends, and the book is addressed to the "Right Hon. William, Earle of Pembroke, K.G." Extract 1:—"I purpose to raise a golden world in the golden vale in Herefordshire (being the pride of all that country) . . . . . being richest, yet from want of employment, plentifullest of poor in the kingdom . . . . five hundred poor within 1½ miles of my house spin flax, hempe, and hurdes. . . . . In May, June, July, make whey, curdes, butter-milk, and such belly provision. As mountes or moles hunt after worms, so these idelers live intolerable by other means. . . . . August, September, October, gather eares of corne, and do much harme. . . . . I have seen 300 leazers or gleaners in one gentleman's cornfield at once . . . . They follow spoyle not like soldiers but like thieves. . . . They pillage rye, barley, pease and oats, &c. . . . . At same time robbe orchards, gardens, hopyards, and crab-trees, and what by begging and stealing they do maintain themselves through November, December, January. Not one of them has five shillings to buy bale of flaxe. Some run to Hereford to fetch some. . . . and bring ½ bushel of corne 3 or 4 miles off . . . . to helpe their miseries. I have *reared* my mill governed by a little bastard brooke . . . . and I built it in spite of envious persons."

Now Gentlemen, I believe I may state how that one of Vaughan's houses was where Hinton Farm now is—200 or 300 yards from Peterchurch Church. There was an old mantel-piece in that house in my time, bearing, I think, a rough sculpture of his arms—three boys' heads, wreathed round their necks with many snakes, and his name. The bastard brooke, he speaks of, was doubtless the little river Dore. . . . . The mill, I have thought, most probably was on the stream just opposite my former, and the present vicar's, house at Peterchurch. Well, wherever the mill was, he says he proposes to build close to it places for every trade, and now comes a long list, ending with two vittelers, with the sign of the Green Dragon and Talbot, and that he means engaging two thousand persons in the commonwealth. Nor was Vaughan mindful only of the temporal well-being of his neighbours, but he had a care for their spiritual welfare also, and sought out a famous preacher, to be maintained for his mechanicals. . . . "A benefice being voyde neere unto mee (which I take to be Peterchurch), I got presentation for a young minister of good witte and good memory, and a pretty dribble of learning." . . . This he adds a little later on. "There was not two sermons in the Golden Vale this 500 years, until my Lord his Grace of Canterbury that now is." . . . He tells a story of how an old monk on dissolution of Abbey of Doier expounded in this place, without license, but made such a mess of his preaching that "at his end he left neither Protestant, Puritan, nor Papist, but a few more inclined to masses than sound religion. Then comes, to stop this state of things, a parson on the scene, who has four services a year in each church" . . . meaning, as far as one can gather, Dorstone or Peterchurch. After this he gets a young parson in to help him, and has eight services in each church, seven early. He speaks of this preacher venturing his life 16 times over great river Wye and down huge hill, clearly the Dorstone hill.

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Then he mentions a chappell for prayer for all his mechanicals and an almshouse for aged persons. Having given an account of his "matters mechanical," and his divers buildings, he goes on to describe his mode of irrigation and the method of his mills, and says, "The place of my residence affords meadow, pasture, all kinds of corne, wood, water, but such a number of beggars as are able to undoe a county," and then begs his Lordship to come and view his water-workes.

And now comes a very interesting bit, as follows :—"An Act of Parliament will be required for joining Peterchurch, Vowchurch, and Torneston, Torneston having only one inhabitant, to make a congregation, the living extending itself but to ten pounds yearly, and being such a miserable allowance for a preacher," he adds, "I desired by Act of Parliament to unite these churches, being patron of two of them, and the third under a Preb. of Hereford"—(the two then being clearly Peterchurch and Torneston)—but he was forbid . . . his opponents averring against his plea for uniting the three parishes that they would have to go a mile (no doubt meaning to the Church at Peterchurch) to a sermon, and that their Church would not contain the three parishes at sermon time.

He talks of the county being much improved by irrigation—says the Golden Vale is seven miles long, and that one grand part of his drainage system consisted of what he calls a Trench Royal, three miles long, ten foote broad, and four foote deep, that he was forced to cleanse this Trench Royal in 1601, and that he got capital manure out of it. And Vaughan ends a funny little book by begging his Lordship "to beare with his merry sorry stile if anywhere I have not observed a precise shollen-like deccorum," and it is signed—

Your Lordship,
Ever beyond his uttermost,
ROWLAND VAUGHAN.

Believing it possible that few if any of my listeners have even heard of this book, I thought it might be interesting to give these few extracts from it, for which I am indebted to my cousin. But now for a few remarks on my special theme, the Church of Peterchurch. And as I can lay no claim to architectural knowledge, I must ask our President to kindly forgive and correct any mistakes I may make in trying to give you an account of the grand old Church which adorns the centre of the Golden Valley. Dedicated to St. Peter—it is mainly of the early Norman style, dated about the 10th century. The Church consists of apse, double chancel (with once, very probably, a central tower), and nave. These comprise a very unusual and complete church arrangement, and form, without doubt, a most interesting example of this period of architecture. There are two other churches in the county and not so very far from Peterchurch, which I suppose are of about the same date. I allude to Kilpeck and Moccas; but these are much smaller, and neither of them possesses the double chancel. Though there is a common touch in all three which seems to bespeak a common builder, no other church, so far as I am aware, approaches this in simple outline and character. You will find that the work throughout is plain and massive, with

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walls about three feet thick. There are few mouldings, and but little ornamentation, except on the middle chancel arch, and abacus of the nave-archway, and on the font. Externally a little enrichment will be found introduced into the string, and heads of the apse windows, and on the head of the South doorway of the nave. The proportions of the plan of the building are very pleasing. The dimensions of the nave are about 53 ft. long by 26ft. 6in. wide; the first chancel (or central tower) a square of about 21ft., the second chancel being 19ft. by 16ft. and the apse 17ft. 6in. wide, struck in with a radius of about 9ft.

The points of interest are six windows introduced into the walls of later architecture, viz., two of the First Pointed (13th century), one Decorated (14th century), and three Perpendicular (15th century). The Priest's doorway in the chancel is also First Pointed, and the two nave doorways (N. and S.) are of the same date as the tower and spire (viz., Decorated).

Placed in front of the apse will be seen the high altar, which is of stone. The top slab is 6ft. 3in. long, by 3ft. wide, and 4in. thick, bevelled on the under side, and it is 32 inches high. On the Gospel and Epistle ends, and in the centre of this slab, there are five incised visible crosses, having reference, I presume, to the five wounds in our Lord's Body. The support is of rough rubble stonework. The top stone slab had to be removed during the restoration in 1869-1870, but no relics were discovered. Probably, then, the altar was erected where a saint's blood was shed, and the Church afterwards added to enclose and protect it.

Within about two miles of the Church is the ruin of a long-disused chapel, adjoining Urishay Castle, and in this chapel is another stone altar precisely similar to the one I have described, and bearing also the five crosses. At Abbey Dore you will also find a stone slab for altar, but minus the crosses. The narrow loop-hole windows, with stone steppings, are very curious in the apse and the nave. A wooden table of oak—before the restoration—stood, and was used as the Communion table, before the stone altar. This is now removed and placed in the vestry or lower part of the tower.

I remember when I was curate in charge, and before the restoration, the inner chancel or the sacrarium was blocked out from view of the congregation. The key-stone of the chancel arch had dropped out, and a wall of lath, plaster, and rubble, three or four feet thick was built up which filled up the whole of the archway, a small organ doorway being left in the middle, and this part of the church was only used at the time of the celebration of the Holy Communion. A stranger once helped me and insisted upon reading the ante-communion service from the stone altar, the old clerk—a son of the Anakims—tried his utmost from his place in the three-decker, to repeat the responses after the commandments, but the stranger's voice in the inner chancel was only a hum, in fact inaudible, and my old friend took off his spectacles, looked piteously round on the congregation, closed his big book with a bang, and said, "It is of no use. I canna' hear him." . . . . A decorated Piscina will be found in the south wall of the nave to the east. There is a noticeable inscription on a stone tablet in the chancel, with an inscription in English and Latin, as follows:—"Here lieth the body of Warden Shaw, minister, who deceased the 14th June, Anno Domini 1658," *sic:*

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ÆTATSÆ
HELEN UXOR
ERAT NANM
HVM
PHRENMQ
RELIOM.

Over the south door-way is a coloured stone tablet of a fish, a good specimen of a trout, having a gold chain round its neck. Some consider it emblematic of the patron saint and the tribute money miraculously procured. There is a legend of a fish of unusual dimensions having been caught by one of the church-wardens in the little river Dore, hard by, and that a plaster cast was taken and affixed in the church to commemorate the circumstance. But probably it originally was placed there as the well-known Christian emblem. The separate letters of Ἰχθύς —the Greek word for fish—constituting the initials of Ἰησοῦς Χριστὸς Θεοῦ Υἱὸς Σωτήρ. In the tower are a few tablets and an old stone of some antiquity. The font of stone is ancient—coeval with the period of the church—very singular in form, narrowed in the waist with a rope moulding, such as forms a beading externally round the apse, which ornament has been cleverly used by the architect in the decoration of the stone pulpit.

Before the restoration two galleries once existed, one in the entrance to the chancel, which only the men entered, and to which there was access by a circular staircase from the chancel in the way to the roodloft; and the other, which was removed in 1869, was at the west end of the nave, and was a rough structure used as a singing gallery. It had no mediæval interest at all, though relics might perchance once have been exhibited from it. Two other rough modern galleries were also taken down in 1869 in the nave and in the chancel on the north. During the restoration in 1869, and chiefly in the chancel, a very large quantity of human remains were found within two or three inches of the surface of the floor level. They had apparently been buried without ever being encased in coffins, and perhaps had first been hurriedly buried elsewhere. In a hole dug for a single scaffold pole I saw about a dozen skulls alone removed. All these remains were carefully buried again in the churchyard.

The old nave roof was blown down and destroyed by a dreadful storm of wind in 1869. It was of oak. At the restoration it was reproduced exactly in form and shape, but not in oak. There was a porch at the north entrance to the nave, but being in a very dilapidated state, and of no architectural interest, it was removed. The architect, Mr. Thomas Edgar Williams, has a harmonious design ready for a new stone porch when the funds, so much desired, are forthcoming.

Re-hung in the tower are six melodious bells, of the following diameters:— No. 1, 3ft. 4in. in diameter, with inscription, "Come at my call, and serve God all." No. 2, 3ft., "Prosperity to this parish." 1782. No. 3, 2ft. 9in., Thos. Rudham, Glo'ster Foundry. 1782. No. 4, 2ft. 7in. (no inscription). No. 5, 2ft. 6in., The gift of S. Exton, C. W. 1782. No. 6, 2ft. 4in., The gift of Charles Garrett, in lieu of one cracked. 1872. By Taylor and Cox, Loughboro'.

The spire and tower are Decorated (14th century) and were a short time back

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in a very ruinous and dangerous condition, but they are now splendidly restore
and the work most admirably carried out and accomplished without an accide
The height of the tower is 80 feet from the ground; spire and vane 116 fe
Total height 196 feet.

They who remember the church prior to 1869 will bear me out when I s
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Some crumbs of comfort, I am sure, may fall to my friend's lot when you
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G. M. M.

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Arthur's Stone. Dorstone-Herefordshire. 1882.

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Woolhope Naturalists' Field Club.

GOLDEN VALLEY MEETING.

MAY 25TH, 1882.

ARTHUR'S STONE, DORSTONE,

By Mr. GEORGE H. PIPER, F.G.S., President.

THE very fine, and tolerably well-preserved Cromlech (Welsh, from *crom*, bent, arched or covering; *llec* a flat stone) on Merbage Hill, in the parish of Dorstone, known by the name of "Arthur's Stone," is one of the most perfect Druidic structures in our Island.

Cromlechs in British antiquities, are huge, broad, flat stones, raised upon other stones set up on end for that purpose.

Rowland partly inclines to the opinion of their having been altars, and partly to their having been sepulchres. He supposes them to have been originally tombs, but that in after times sacrifices were performed upon them to the heroes deposited within. Skeletons have been discovered under them. The Cromlech chiefly differs from the Kist-faen in not being closed up at the ends and sides, that is, in not so much partaking of the chest-like figure. It is generally of larger dimensions and sometimes consists of a greater number of stones. The terms, Cromlech and Kist-faen, are however indiscriminately used for the same monument.

Although we would gladly associate Arthur's Stone closely with the great British Hero, whose name it bears, and enrich it with some of the glorious traditions of his prowess and knightly worth, we are compelled to assign its erection to a period prior to the Roman invasion, and certainly more than 500 years before the era of the Great Pendragon, who was born at Tintagel, about the year 501. He established the first Military Order that was ever instituted in Britain, and by its means raised a glow of ingenuous heroism—the first spirit of chivalry that ever appeared in Europe—that manly and honourable gallantry of soul, which has made him and his worthies the subjects of romantic histories over all the world.

Beyond the assertion that it is pre-Roman its age is a question of mere conjecture.

The generally received opinion is that the name, Arthur's Stone, is simply a

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corruption of Thor-Stein, the Stone of Thor, or Thor's Altar, from which it is suggested the parish takes its name, Thorstein, Dorstein or Dorstone; but this is not wholly satisfactory or conclusive; if it be so the Saxon invaders must have adopted for their ceremonial rites, an ancient Keltic structure, which is improbable. The name "Stone," whether preceded by "Thor" or "Arthur," must be English—an English suffix given to an ill-understood relic of antiquity. It would seem more likely that the original British name was lost, and at some later period the name of "Arthur" was given to the Cromlech as a vague memorial of a shadowy but celebrated hero, whose name was so well known throughout Britain, and one of whose residences was not far distant. The title page of Duncumb's "History and Antiquities of the County of Hereford," published in 1804, has a fine woodcut of the Cromlech, as it then appeared, and although not signed with Bewick's name, there can be little doubt that it is his work. We have it on the authority of that eminent geologist, the Rev. W. S. Symonds, F.G.S., that "the large incumbent stone was no doubt hewn from the rock close by." The adjacent quarry was exposed which enabled a correct opinion to be formed. The other stones, some of which have fallen from their originally upright position, belong, Mr. Symonds says, for the most part, to the hard limestone of the cornstones, and are not in situ on the horizon of the Cromlech, but lie scattered about as boulders upon the land. All the stones belong to the Old Red Sandstone of the Country. On the south western side the Cromlech is close to an ancient road, probably British (as most of the British roads ran along the summits of the hills), in the angle, formed by another ancient road that comes up the hill to Dorstone, and is now used only for agricultural purposes, and as a bridle road. The Cromlech stands fifteen miles due north of the Skirred-fawr. A line drawn from the Skirred-fawr, near Abergavenny, northwards to Arthur's Stone, would pass over the Camp on the southernmost point of the Hatterill Hill, Old Castle, Longtown Castle, and Urishay and Snodhill Castles. It consists of several stones, about 18 may be counted now, besides fragments. The chief feature is the large incumbent stone broken into three parts, and resting upon about ten smaller upright stones of various dimensions. In form it is nearly oval, the sides, east and west, being straight; with two irregular sides north and south, the north somewhat curved, pointed at the extremity, and eroded considerably. An evident fracture of the stone has shortened the south end, which is about four feet in width. The long axis is due north and south, measuring about nineteen feet. The short axis, east and west, is twelve feet. The straight side, on the west, is fifteen feet, and on the eastern side thirteen feet. The thickness varies, and probably nowhere exceeds two feet. Between the under-surface of the stone and the ground is a space of about four feet; formerly the distance was greater as the hollow has been partially filled up by worm casts and other means. At a distance of eight feet from the south end of the large stone is an upright one, five feet high, and five feet six inches broad, standing with its edges east and west. A similar, but smaller stone may be seen further on, and several fragments lie around. A small Avenue occurs at the north end of the large stone, leading from it to the old road, and formed by

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Arthur's Stone in 1804.

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five or six stones standing erect, with their edges north and south. They project from one to three feet above the turf, and bear evidence of much erosion; the avenue is in width about four feet, in length nine or ten feet. Fragments of stone lie scattered about more or less buried in the soil and covered by turf. The whole stands on a mound of oval shape, its long axis twenty yards, its short axis ten yards.

To this modern description we are fortunately enabled to add some most interesting particulars, written by an intelligent and competent observer, who made a personal inspection of this interesting object, at the beginning of the reign of Queen Anne, or about 180 years ago.

In the first English Edition of Camden's Britannia, which was published in the year 1610, no mention is made of Arthur's Stone, nor is it marked on Speed's Map of that date. The other writer referred to is Nathaniel Salmon, a Bachelor of Laws, Antiquary and Historian, who was born *circa* 1676, son of the Rev. Thomas Salmon, also an antiquary. In Salmon's book, published in 1728 and 1729, entitled "A new Survey of England, wherein the defects of Camden are supplied and the errors of his followers remarked," he says,—"The remarkable curiosity of Rolle-Rich Stones (in Oxfordshire) hath not been sufficiently explained, either as to the original Form of that Monument, the age of it, or the Intention of the Erection. Out of the several Guesses that have been made, some hints may be taken, and seem capable of Improvement."

"Comparing that of Stonehenge with this, and the other in Cornwall, mentioned by the Right Reverend Annotator upon Camden, and a fourth which I have seen about twenty-five years ago, in Herefordshire, I am of opinion they are all the work of the same age, and made with the same intention."

"If my conjecture be right that of Herefordshire having more Remains of its Ancient Figure than any of the rest, is first to be described."

"Upon a hill west of the river Wye above Bradwardyn Castle, in the way toward the Black Mountains, is a flat, oblong stone, or a number of stones joined together, lying upon the pedestals of rude upright stones fix'd in the earth, after the manner of Rolle-Rich. A great part of the work is entire; the supporting stones being at the same distance from the verge of that they bear. The eastern point (as I remember it was eastern), is narrower than the rest as much as the eastern part of a gravestone. It seems to have increased in breadth toward the west, but the western end being demolished, as well the upper stones as the pedestals, neither the length of the whole nor the breadth of the western part can be determined. What remains (as I remember), was about six yards long, and two yards broad. The flat stone was then in three pieces, but the sides of those pieces answering one another, and not joining as they would have been made to do if they had been originally single, but indented like something broken, I take them to have been but one at first. From whatever quarry it was brought, or by whatever carriage, it hath the air of a natural stone, not of one put together with a strong cement. Its height from the ground was about twenty inches. I remember the sheep of the country, which are small, sheltered themselves under it from the sun. The name by which the country people call this, is Artil's Stone,

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corrupted probably from Arthur's Stone. This may have been taught them by somebody that had a notion of Arthur's Round Table, thinking this erected with the same design. Or supposing this to be of the same age and design with Stonehenge, the memory of Arthur may be kept up by its similitude to the other, for Arthur, according to our Monkish History was a great man; and the honour attributed to Aurelius Ambrosius, who took upon him the government of the Britons when their affairs were desperate, after the departure of the Romans, Arthur is always allowed to share in. This might be from Arthur's being a Briton, whereas the other was half if not wholly of Roman blood."

* * * * * *

"With due submission to those that pronounce otherwise these monuments seem the work of the Britons before Cæsar invaded them: it could not be of the Britons during the Romans' stay, for nothing was done then but Roman, and these are not like Roman. Nor could the Britons do it afterwards, who were, alas! too much harass'd by their enemies to go about such a work as this for shew. Had the Saxons set up these stupendous pillars we must have seen more of the sort about the Island, and we should probably have had some account of it in their own or the British annals. Nor had the Danes quiet possession here long enough to carry on an undertaking that required so much time and application. The manuscripts of Ninnius, which mention Stonehenge, written two hundred years before the Danes had any considerable footing on this Island, decide the matter sufficiently against them."

"Two things ought to be cleared up before we go farther. The first is, that if this was a sepulchral monument erected by Pagans, we might expect to find barrows at some small distance. If it were Christian we might expect to meet with a cross or something of that kind implying the design."

* * * * * *

"I confess there is a cross stands within a furlong or two (as near as I can remember) of Artil's Stone in Herefordshire: which phœnomenon my readers are welcome to apply to what Hypothesis they please."

"It is upon a road over the mountain: an old coarse stone about eight foot above the ground, and about a foot and half broad. The figure of a cross is made by cutting into the stone an inch, or two, as we see them sometimes in churches."

"The second difficulty to be accounted for, is, that this Arthur's Stone if coeval with Stonehenge, Rolle-Rich, and Biscaw-woune, should hold it out so bravely against time and weather, to which the rest have submitted. It is possible this being a natural stone may bear weather better than a compounded one, as I suppose the rest to be. And it is possible the race of Britons driven up to those mountains who are fond of pedigree, and delight in poems upon their worthies and heroes, may from time to time have repaired this decaying monument."

Salmon's details possess great interest, and prove that the appearance of the Cromlech is now much the same as it was two hundred years ago. The great top stone was then broken, and the description generally would apply to the present state of this curiously interesting ruin enveloped as it is in ages of mystery.

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The "Old coarse stone about eight foot above the ground," bearing the incised figure of the Cross, should be the object of careful searches and enquiries. Such a stone would not have been broken up, and may yet be found built into the wall of some house or out-building. A careful—very careful—exploration should be made in the supporting mound, directed particularly towards a large stone shewing evident traces of tool-work, now lying against the bank of an adjacent hedge-row.

Now as to King Arthur. Whittaker's very able and learned treatise tells us his principal exploits were against the Northern Saxons, whilst he was only the Prince of the Silures, and Ambrosius was Pendragon, or Dictator of the Britons.

In a series of probably five campaigns, and in a succession of certainly eleven victories, this great Commander expelled the Saxons from the greater part of Britain. The twelfth battle of Arthur was fought in the South of England, after he was elected to the Pendragonship, against Kerdic, the Saxon. This extraordinary victory completed the circle of his military glories. The whole of our Island is in traditionary possession of his character, and more than six hundred places within it are still distinguished by his name. It is well established that the city of Caerleon, the capital of Silures, was his habitual residence, and as Arthur's Stone is distant some thirty-one or thirty-two miles only from that ancient capital, and lies immediately between it and the scenes of some of his martial exploits, it is not unreasonable to suppose that he made frequent visits to this mystical structure, before the hand of the Spoiler, Time, had destroyed its symmetry and marred its rude magnificence. Indeed it would require but little effort of the imagination to see his stout spear, Rone, made of ebon wood; and his well dinted shield Pridwen, lying on the great altar now before us; while he, grasping his trusty sword Excalibar, given to him by the Lady of the Lake, stood on the very spot we now occupy.

These arms were described in the uncouth, but remarkable language of Layamon, in the 12th century, and again three hundred years afterwards, in the rude numbers of Michael Drayton.

> "The temper of his sword, the tried Excaliber,
> The bigness and the length of Rone his noble spear,
> With Pridwen, his great shield, and what the proof could bear."
>
> DRAYTON.

Sir Walter Scott has drawn a vivid picture of King Arthur surrounded by his favourite Knights; this may have been the very place of their assemblage, and thus he sings about them—

> There Galaad sat with manly grace,
> Yet maiden meekness in his face;
> There Morolt of the iron mace,
> And love-lorn Tristrem there:
> And Dinadam with lively glance,
> And Lanval with the fairy lance,
> And Mordred with his looks askance,
> Brunor and Bevidere.
> Why should I tell of numbers more?
> Sir Cay, Sir Banier, and Sir Bore,
> Sir Caradoc the keen.
> The gentle Gawain's courteous lore
> Hector de Mares, and Pellinore
> And Lancelot that evermore
> Looked stol'n-wise on the Queen.

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Although we have no actual proof that King Arthur ever visited this spot history tells us that another king—a descendant of the great chief—was here, in a condition little better than that of a hunted fugitive.

We learn from Webb's History of the Civil Wars, that in the month of September, 1645, King Charles left for the last time the Princely Towers of Raglan and its honourable open hearted lord. Bristol had fallen, and the Royal troops had been defeated everywhere. The King with a few followers took his melancholy way through Monmouth to Hereford en route for Chester. The Roundhead Poyntz with 2,000 horse held Leominster and barred the way. The King marched towards Bromyard but returned, for Gerrard's men at Ludlow were not notified in time to aid his progress. The Royal Guards were quarted at Madley. The following day Langdale's horse were brought up out of Wales to quarters about Byford, and on the 17th September the rendezvous of the little army was appointed at Arthur's Stone with a view to reach Chester through Radnorshire. The King passed the day on what was then a wide stretch of open hill where this mysterious monument of unknown ages looks down upon a broad region of fertile vale and picturesque woodland. Whether from irresolution or design his advance in this direction was stayed, and he slept that night at Holme Lacy. On the 18th he advanced to Stoke Edith on his way to Worcester, but finding Poyntz had made a night march to intercept him he again changed his direction and passed by way of Marden and Wellington to Leominster and Presteigne, and thence to Chester in time to witness on Rowton Heath the defeat of his army and the extinction of his hopes.

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Woolhope Naturalists' Field Club.

JUNE 29TH, 1882.

COXWALL KNOLL. BRAMPTON BRYAN PARK. THE PEDWARDINE SHALES.

"Brave Caradoc! applauded by thy foes,
What shall thy friends thy grateful Britons say!
What columns and what altars rear of fame!
Thrice told five hundred courses of the sun,
Thy age is green, thy laurels freshly bloom."

THE site of the last of the many battles of Caractacus; the ruins of Brampton Bryan Castle, immortalized by the siege so bravely and so successfully withstood by Lady Brilliana Harley; and rocks containing remains of some of the earliest organisms created—all placed moreover amidst the most lovely scenery of North Herefordshire—combined to make this excursion of the Woolhope Club especially attractive. It proved to be very enjoyable, for a kind and genial reception awaited the members, excellent papers were read, and the weather was very fine. Thus another "red letter day" has to be marked in the archives of the Club. The route from Hereford was a long one. The train went to Craven Arms, and from thence to Bucknell Station at the foot of Coxwall Knoll. It was broken by half-an-hour's delay at Craven Arms Junction, and the interval was utilized by the transaction of the ordinary business of the Club. Four new members were enrolled by the usual ordeal of the ballot, several others were proposed for future election, and some other small matters discussed. Enough time still remained to take a list of the gentlemen present. The President, Mr. Thomas Blashill, was supported by the Rev. J. D. La Touche, president of the Caradoc Club; and Mr. G. H. Piper, president of the Malvern Club; the Revs. Augustin Ley, H. W. Phillott, H. B. D. Marshall, J. Tedman, C. Burrough, J. Woollam, F. S. Stooke-Vaughan, C. C. Sharpe, and F. Sheffield; Drs. Bull, Chapman, and Wilson; Major Doughty; Captain Noyes; Messrs. A. C. De Boinville, H. Vevers, C. T. Paris, H. Southall, H. C. Moore, T. Salwey, T. and C. Fortey, George Cocking, P. C. Cleasby, W. J. Lloyd, Ernest Bull, C. B. Beddoe, E. Morris, Edwin P. Lloyd, T. D. Burlton, Rhodes, Oates, Wagner, La Touche, jun., Knott, Theo. Lane, and several others, who put in a later appearance. Dr. Callaway, from Wellington, who had arranged to give the field address on geology, did not appear, having unfortunately missed the train. At Bucknell station the visitors were very kindly met by Mr. R. W. D. Harley, of Brampton Bryan, the

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Hon. Mrs. Harley, Miss Singleton, Miss Sophia Singleton, and another lady, who gave the Club a cordial welcome and the honour of their company during the day's excursion. A start was at once made under the guidance of Mr. Charles Fortey, for the camp, Coxwall Knoll, (from Cychawl Cnol, a boat-shaped hill), which is a bold isolated hill, some 800 feet above sea level. The easiest approach is from the north side, and was the one taken, but under a hot sun it was a steep climb to the wooded summit. The camp is really double, two ovals, side-by-side, surrounded by a common fortification and divided by a very bold and steep northern rampart, so that if the lower southern side—that facing the Roman camp, at Brandon, were taken, there would still be the ditch and steep embankment, of this higher northern and inner camp to be overcome. It is important to remember this when the account given by Tacitus is literally relied on, for these higher embankments, plainly visible from Brandon, might themselves form the third obstacle (imminentia juga) to be encountered by the soldiers of Ostorius. The ditch between the two portions of the camp contains the pools which supplied its defenders with water, and it may be added also that this ditch now forms the lines of separation between the counties of Herefordshire and Shropshire. To explore properly this most interesting camp would be a day's work, rendered difficult as it now is by the underwood and tall trees which cover its whole surface. It was intended to read the first paper in full view of the camp at Brandon, situated about two miles off on a slight eminence in the plain below, but the trees prevented this, and so, selecting a spot from which it ought to have been seen, the following paper was read :—

"THE SITE OF THE LAST BATTLE OF CARACTACUS."

By the Rev. Charles Burrough M.A., Rector of Eaton Bishop.

In the view it is proposed to take of the last battle of Caractacus, "Coxwall Knoll" is the central feature.

Here it was, I suppose, that the final clash of arms was heard, which was not hushed till the British were defeated, and their hero put to flight at "Caer Caradoc."

I had the honour of reading papers on this subject before the "Caradoc Field Club," in 1877 and 1878, and in justice to myself, and apology to you, I might well pause to explain how little time I have been able to give for the collection of fresh facts, or arguments in support of the theory you are invited to consider. But while I cannot pass on to our subject without asking your indulgence in criticizing this attempt to settle a question, which, perhaps from the want of data, can never be satisfactorily disposed of, it would be discourteous if, in doing so, I did not confess a sense of inadequateness to the occasion, as I am put forward to day to act as the pioneer of gentlemen, far more qualified than I, in antiquarian and historical research, to deal with this most interesting inquiry.

My argument is founded mainly on what Tacitus tells us in his Annals (Book xii., 31.36) accepting what he says as an accurate though concise history;

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written from the Roman point of view, and so, though with no consciousness of deceit, making the most of the dangers and difficulties the Roman arms encountered; while satisfied with a hurried glance at hindrances and rebuffs, in his impetuosity to alight on "the glorious victory"; which as it crushed the hope of Silurian independence, virtually gave the death-blow to resistance to the Roman occupation of Britain. To quote from a former paper: "It seems that after Julius Cæsar's second invasion in B.C. 54, Britain was unmolested for nearly a century, *i.e.*, till A.D. 43. Cæsar's conquests did not extend, perhaps, north of the Thames; but the results of his invasion, in mercantile intercourse, etc., worked wonders, considering the initial barbarism, in civilizing not only the southern, but the south-eastern tribes." Romans and Romanized Gauls were continually and increasingly settling in Britain; the people more and more affected Roman manners, while the young nobles and richer commoners sought, no doubt, at Rome the education their own land could hardly yet afford. There was thus a current of sympathy with their conquerors flowing in constantly augmented volume; and we may see in the court of Cunobelin, King of the Trinobantes (the Cymbeline of Shakespeare), who was the acknowledged King of the south, how the country was being gradually prepared for its impending humiliation; just as, a thousand years later in our national history, the Saxon Court of Edward the Confessor foreshadowed the Norman Conquest. Though London and Camulodunum (Maldon in Essex) were at this time considerable towns, and a gold coinage was in circulation, our British predecessors of the south-east seem to have lost all their old patriotism in the peace and prosperity which the reigns of Augustus and Tiberius allowed them; for, when the request of a son of Cunobelin gave Caligula the opportunity of invasion, his general, Aulus Plautius, (said to be husband of Gladys, sister of Caradoc, a Christian, see Tacit: Annal: xiii. 32) landed in Kent without the least opposition;—in fact, the Cantii and Regni (tribes of Kent and Sussex) rather welcomed the invader. But not so the Trinobantes (still the chief tribe, as in Cæsar's time), who were now governed by Caradoc, a son of Cunobelin. They, for a while, assumed a valour, if they had it not! The course of the struggle may, perhaps, be followed by the line of Roman camps, but Tacitus fails us from A.D., 43-47. It seems that Caradoc was driven north of the Thames, perhaps into Gloucestershire, and to the borders of the Silures.

In A.D. 44, after fighting 30 battles, Vespasian reduced the south-west of Britain. The Iceni (Norfolk and Suffolk) submitted, and Cogidubnus, chief of the Regni; so that by the end of A.D. 44 Britain, except the north, the midland counties, and Wales, was annexed to the Roman Empire.

The year 47 brings us the first notice of Britain in the Annals. It was during this year that Ostorius Scapula, the future conqueror of Caradoc, was appointed to the command of the Roman army in Britain. His first operation was to occupy with encampments the whole country to the Gloucestershire Avon and Severn; and after conquering the Iceni, who had rebelled, and the Cangi (?), the Roman general invaded the territories of the Silures, who it is certain occupied South Wales (*i.e.*, the shires of Hereford, Monmouth, Radnor, Brecon, and Gla-

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morgan), and may have extended into Gloucestershire along the banks of the Avon. The Silures seem to have succeeded to the position of the Trinobantes, whose name does not occur in the campaign, and exasperated by the threat of Claudius to exterminate them as he had the Sicambri, they passed, under command of Caradoc, northwards, into the territory of the Ordovices on the approach of Ostorius. Here Caradoc was joined by many refugees "qui pacem nostram metuebant."

There is no doubt, I believe, that "Brandon Camp," (Bravinium) was a camp of Ostorius. It is placed on a tableland adjoining the branch of the Great Watling street, which went from Uriconium over the Severn to Caer Leon (Ant: Itin: ii.,, xii.) and encloses some five or six acres.

Coxwall Knoll, two miles to the north-west, I take to be the champion fortress of Caradoc, which, from its position with regard to Brandon Camp, would be the most convenient hill in the neighbourhood from which to observe the movements of Ostorius; and as we shall see, capable of fortification sufficient to make up, in a great degree, for its comparative want of space. The river, then, of varying depth (vado incerto), which ran between the confronted armies was the Teme (in Welsh Tevidiog. The termination iog or ioch being equivalent to iacum in Latin). It is not necessary to stay to consider whether the Teme offers difficulties for advance or retreat which Tacitus says the nameless *amnis* offered Ostorius. The Teme may be a much smaller river than it was 1,800 years ago. And it is possible that the *alluvium*, three-eighths of a mile wide at Bucknell, represents a wider bed than we see now. It is also probable that this campaign of Ostorius, begun at the beginning of winter (cœptâ hieme) may have had to contend with swollen rivers. But the difficulties were more apparent than real; for Tacitus says the ford was effected with ease (haud difficulter!). And now we come to the argument by which our theory must, I think, stand or fall. You will have noticed that Tacitus draws a distinction between the position Caradoc occupied and the threatening hill-tops (imminentia juga) that lay in the rear. The "forlorn hope" seems to have fortified all the neighbouring hills so as to appropriate all the natural advantages of the place; and, till the river was crossed, Caradoc "was flying hither and thither" (huc illuc volitans), exhorting the defenders rather to die than yield, for "that day and that battle would be the beginning of the recovery of their freedom, or of everlasting bondage" (illum diem, illam aciem testabatur aut recuperandæ libertatis, aut servitutis æternæ initium fore). Tacitus owns that the enthusiasm which Caradoc's words kindled confounded Ostorius. He was daunted, too, he says, by (1) the river in his face (objectus amnis); (2) the rampart in addition (additum vallum); (3) the threatening hill-tops (imminentia juga); and the stern resistance and masses of fighting men everywhere apparent. If you could see Coxwall Knoll, and the semi-circle of hills supporting it from the farther side of the Teme, you would not find much difficulty in applying the description Tacitus gives. Then again at the end of the 33rd chapter Caradoc is said to have drawn up his armed bands, *pro munimentis*, not, of course, "in front of," but "on the front ridge of his defences." This, read after what he says about piling up stones to serve as a rampart (in modum valli) wherever the sides of lofty hills could be approached by a gentle slope, seems to

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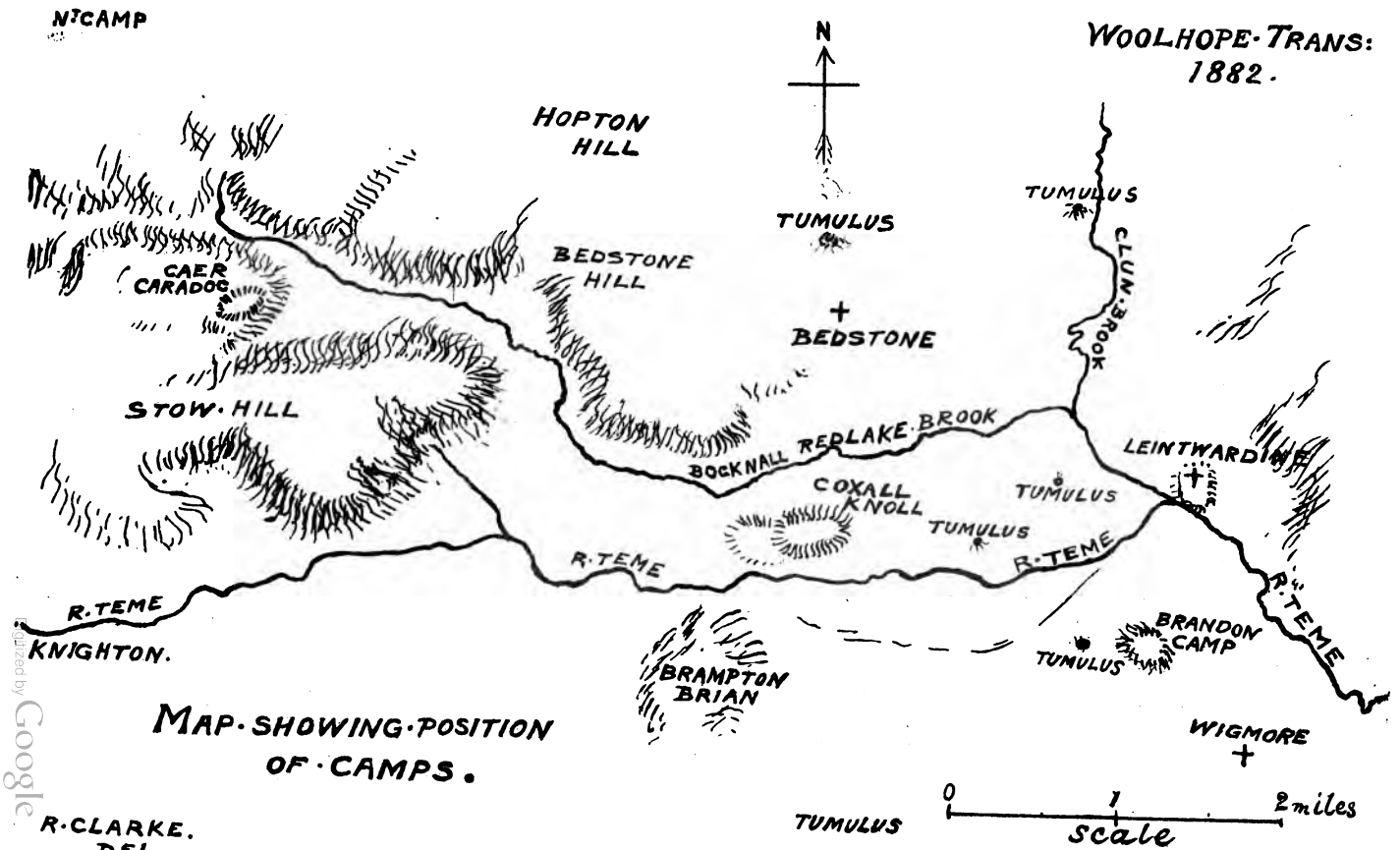

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WOOLHOPE·TRANS
1882·

N

CAMP

CAMP

BRAMPTON
HILLS

TEME

COXALL·KNOLL

SECTION·THROUGH·VALLEY

COXALL·KNOLL

50 yds 100 yds yards 200

SCALE·

R·CLARKE.
DEL·

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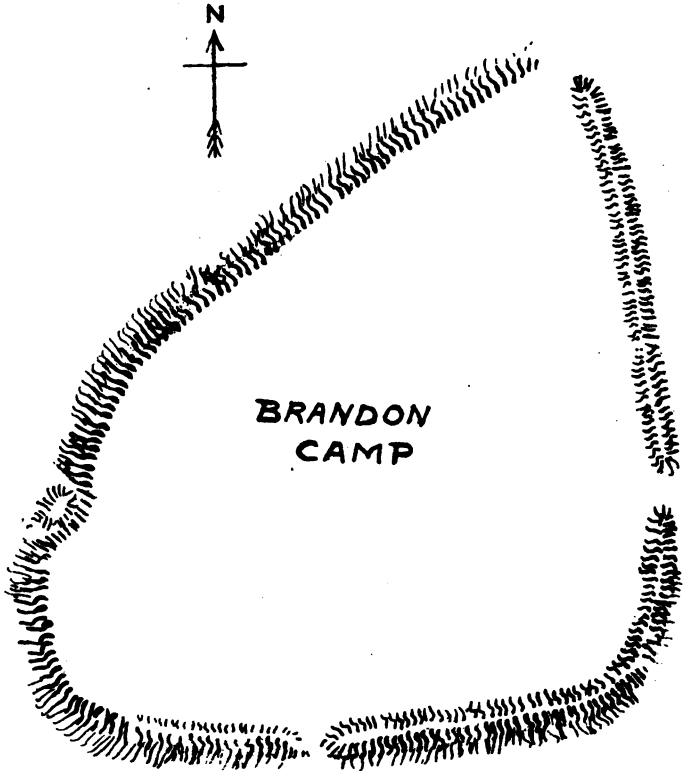

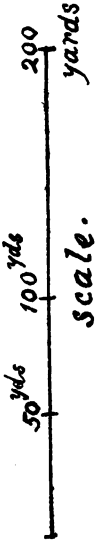

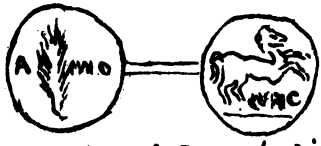

Gold·coin·of·Cynobelin
or Cunobelinus

obverse [C] AMO [CAMULODUNUM] Ear·of·corn

Reverse CVNO [CUNOBELINUS] · Horse·to·Right

R·CLARKE.
DEL.

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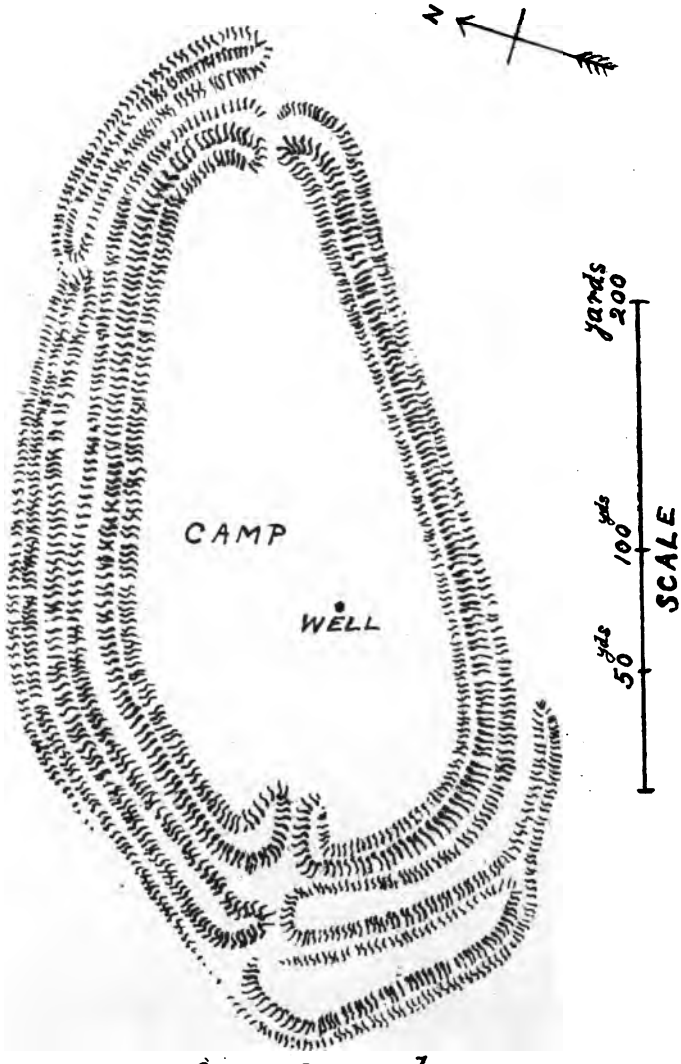
WOOLHOPE·TRANS:
1882·



Caer Caradoc
or
Gaer. Ditches.

R·CLARKE.
DEL

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suggest that the Vallum, or second impediment the Romans had to encounter, was nothing else than a hill which was strongly fortified "in modum valli." But this Vallum is spoken of in the 35th chapter as an Agger. They had crossed the river without any difficulty at all. "When they reached the Agger" (ubi ventum ad aggerem), evidently at some little distance from the river, "as long as it was a fight with missiles the wounds and the slaughter fell chiefly on our soldiers; but when we had formed the military *testudo*, and the rude ill-compacted fence of stones was torn down (rudes et informes saxorum compages distractae) and it was an equal hand-to-hand engagement, the barbarians began to retire to the heights" (decedere barbari in juga montium), or, as I suppose, eventually to Caer Caradoc, three and a half miles to the north-west. Coxwall Knoll is a double hill, divided by a valley which serves as the boundary of Herefordshire and Shropshire. The eastern and much smaller part of the hill is semi-circular; the western forms an ellipse. It is easy to understand how, if these two summits were fortified, so as to form a double *agger* over the intervening valley, the hill was no insignificant post, nor so long as Caradoc could fight with missiles on the crest of the hill from behind the earthworks was the "gentle slope" of the valley of much advantage to the besiegers: I think, then, that this hill, locally known as a "Caer Caradoc," may well be considered the spot where the battle began after the Romans had crossed the Teme, if it will consent to be known as the "agger" or "vallum," which Tacitus says was the second obstacle that daunted Ostorius as he reconnoitred from "Brandon Camp." The "imminentia juga," "montibus arduis," "juga montium," are all distinguishable, as it seems to me, from the place where the battle was begun, which was evidently at the "vallum" or "agger," on this side the river. The retreat to the "Gaer ditches," or "Caer Caradoc," at Chapel Lawn, with its necessary carnage, may have been the occasion of the little stream which runs at the foot of the two hills and falls into the Clun (Colunwy), receiving its name "Red Lake," for "Red Lake" may be a corruption of "Rhudd Lli," which I find would be the old Welsh for "red stream," and there is a tradition in the valley that once a great battle was fought at Chapel Lawn, and the "Red Lake" flowed with blood for three days.* But one point more must be noticed before I cease to tax your attention, and that is the rather peculiar description Tacitus gives of the final struggle on the heights. He says, "Yet even there both light and heavy-armed soldiers rushed to the attack; the first harassed the foe with missiles, while the latter closed with them, and the opposing ranks of the Britons were broken, destitute as they were of the defence of breastplates or helmets. When they faced the Auxiliaries they were felled by the swords and javelins of our Legionaries; if they wheeled round they were again met by the sabres and spears of the Auxiliaries." This involves an attack in front and rear—the Roman repartee for the way they had been received at Coxwall Knoll.

*ἐρυθάνετο δ' αἵματι ὕδωρ.—Il. xxi. 21. And compare the Victory of Hannibal, at Lago Tresimeno, on June 21st, 217, B.C., when a brook ran with blood, and was called in consequence Sanguinetto.

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Now if the "Gaer Ditches," with its entrances east and west, was the scene of Caradoc's defeat, what more likely than that the Auxiliaries, or light-armed troops, were told off for the pursuit from "Coxwall Knoll," &c., and to attack on the steep eastern side of the hill; while, (and there is a local tradition about this too) the Legionaries or heavy-armed troops, marched up by the Teme, under cover of Stow Hill, and attacked the last Fortress of Caradoc, where his wife and daughter were, at the more accessible western gate; so that "si auxiliaribus resisterent, gladiis ac pilis legionariorum; si huc veterent spathis et hastis auxiliarium sternebantur"?

Caradoc made his escape, but was delivered up by Cartismandua, his mother-in-law, Queen of the Brigantes, to Ostorius, whose triumph he adorned at Rome. The Emperor granted pardon to Caradoc, his wife and brothers, and if we may trust tradition in this case, to his daughter Gladys too, for she was married in A.D. 53 to a rich Senator, Aulus Rufus Pudens Pudentianus, and was adopted by the Emperor, and so took the name of Claudia.

Martial wrote some Elegiacs a few years later, in which he sings of Claudia's beauty—

"Quale decus formae! Romanam credere matres,
Italides possunt, Atthides esse suam."

And of the marriage—

"Nec melius teneris junguntur vitibus ulmi,
Nec plus lotus aquas, littora myrtus amat."

St. Paul sends the greeting of Pudens and Claudia in his Second Epistle to Timothy (iv. 21).

The Palace of Caradoc, which the Emperor had assigned him, was afterwards the residence of Pudens and Claudia. Their daughter, Claudia Pudentiana, converted it into the first Christian Church at Rome, known first as the Titulus, and now as St. Pudentiana. Baronius says, "It is delivered to us by the firm tradition of our forefathers that the house of Pudens was the first that entertained St. Peter at Rome, and that the Christians assembling formed the Church, and that of all our churches the oldest is that which is called by the name of Pudens." If these things were so, the subject of this paper has more than an antiquarian interest. The noble struggle of our last British hero was to have a yet nobler end; and defeated though he was, as we believe, in this very locality, the defeat led to great things for him and for his. He might well be content to sheathe his sword, since he had a Gladys, in the wife of Pudens, whose memory should glitter all along the victorious march of the Catholic Church.

The PRESIDENT thanked Mr. Burrough, on behalf of the Club, for his very interesting and careful paper. Time did not admit of that discussion on the spot, which generally leads to this favourite subject. The question was taken up, however, by several groups in their descent to the village of Brampton Bryan, and from time to time during the day, and the ideas evolved may be thus summarised. The argument was good from the Tacitus point of view solely, and

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made the most of; but that this must necessarily be vague, since the historian, in all probability, wrote from the description given him by others, and there is no proof that he visited England himself. In favour of the author's paper, very strong arguments may surely be drawn in this instance from the positive evidence of the British and Roman fortifications in juxtaposition, with the gloomy support of the numerous tumuli, barrows, or burial mounds in their vicinity, the discovery of implements of warfare in their neighbourhood, and the tradition of battles handed down from generation to generation. These camps abound throughout Herefordshire. Beyond question, this county was the chief scene of this protracted struggle, for the names of the commanders are often given to the camps, and the size and strength of several prove them to have been occupied for considerable periods. Wherever the British earthworks are large and important, a strong Roman camp is to be found in its vicinity: thus the great camp on the Herefordshire Beacon was opposed by the important camp on Wall Hills; the British camp on Doward, by those of the Romans on Symond's Yat and Great Doward; the river Wye was guarded by the Roman general on the one side by Dinedor camp (formerly called Oyster Hill or Ostorius' Hill), and on the other side by Caplar camp (from Scapula his second name) so as completely to command it. Caractacus, too, watched the river from the Caradoc camp lower down. Credenhill camp was opposed by Magna Castra at Kenchester, with outposts at Burghill, Breinton, and Eaton. Caractacus, at Ivington camp was opposed by Ostorius, at Cholstry (a corruption of Caer Ostruy, or Ostorius fort). Risbury camp was watched by the Roman station at Black-Caer-dun; the fine British camp of Wapley, by the square Roman camp at Ashley and on Bradnor Hill; Croft Ambery, by a square camp at Aymestry; and there are numerous other camps, both British and Roman, of lesser importance, spread over the country. Mr. James Davies, of Hereford, who has studied very closely Roman remains in this district, published a lecture many years since (1850) in which he endeavours thus to trace, by the existence of opposed camps, the course of Caractacus before the Roman legions. From Doward to the Herefordshire Beacons, and from them along the Malvern Hills to Whitborne, Thornbury, Bredenbury, Netherton, Upperton, Risbury, Ivington, Carne Hill (Corner Cop), Wapley Croft, Ambery, until he took up his position at Coxwall Knolls, with the camp of Caer Caradoc (Gaer Dykes or Gaer Ditches) three miles in the rear. This is, of course conjectural, for since the struggle lasted some eight or nine years, some of the camps must have been occupied for long periods, and there would doubtless be considerable periods of inactivity. The barrrows, again, might be studied more closely with advantage to the argument, for Roman barrows differ from British barrows, and these and evidences of warfare are very numerous in the vicinity of Coxwall Knoll, as at Leintwardine, Pedwardine, Brandon, Bacton, and elsewhere. For example, if, as has been said, the two barrows in the immediate vicinity of Brandon are Roman barrows, it would go far to prove that Caractacus acted on the offensive and attacked the Romans twice in their intrenchments. These more wide and general considerations support strongly the opinions given in Mr. Burrough's able paper. Beyond doubt, this great battle was fought

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somewhere here, and many who know the district well, think it was the last of many struggles in the Valley of the Teme. When Coxwall Knoll was gained it would be but the conclusion of the day's fight to finish it at Chapel Lawn and the Gaer Ditches, as is so well suggested by Mr. Burrough. The Camp of Caer Caradoc is formed on a projecting spur of Stow Hill, some 1,300 feet above sea level. The ascent on three sides is extremely steep, and it is strongly entrenched on its western entrance, where its approach is easy. It is a spacious camp, but, as Camden observed long since, the native rock is everywhere close to the surface, as if all the soil had been removed to form the earthworks. It has no water supply, and thus, though well fortified against a sudden seizure, it could never have withstood a protracted attack.

The wild flowers are very beautiful this summer, bright in colour and luxuriant in growth, but it is not for these qualities especially that botanists seek them. In passing through the camp they only admired the brilliant Foxglove and the attractive *Lychnis*, but they gathered *Paris quadrifolia* and *Sedum Telephium* in both camps, and on the lower southern one, which is in Shropshire, *Corydalis claviculata*, and in the hedgebank near the village of Brampton Bryan one of the most poisonous of British plants, *Œnanthe crocata*, Hemlock, Water Dropwort, was growing luxuriantly.

Passing through pleasant meadows, teeming with flowers, and crossing the river Teme, the visitors were conducted by Mr. Harley into the gardens. The walled kitchen garden presents the peculiarity of surrounding a considerable orchard in the centre, with here and there a tree-covered walk and some beautiful trees. A group of Scotch Firs are pretty, but more remarkable still is a Larch tree that, having met with a serious misfortune in early life, has thrown its growth into lateral branches. The trunk of this tree is noticed in the archives of the Club as measuring, in 1868, 14ft. in circumference at five feet from the ground. It shows how picturesquely the common larch fir can be made to grow. Why will not people more frequently cut off the top of young luxuriant larches at some 20 feet from the ground in situations where ornament, and not timber is required? Three very fine Lime trees grow in front of the Hall, probably planted shortly after it was built (1661-5). Fourteen years since these measured respectively 15ft. 9in., 17ft., and 16ft. In the hurry of the visit on this occasion the tape was not passed round them.

The visitors now assembled in front of the ruins of Brampton Bryan Castle. This Castle was never intended as one of those grand feudal strongholds which would enable their owners to dominate the country side or defy the King himself. It is placed on comparatively low ground where a large moat could prevent close access to its walls. The grand entrance, which now forms the chief part of the remains, though thoroughly furnished with all the usual items of defence in portcullis, and massy doors, and guard rooms, and inner portcullis and door, must always have seemed to smile a welcome, as indeed it did to the present party. Its doors and windows are large and of beautiful shape, and their fine mouldings are richly decked with the ball flower ornament. This ornament was to be found in Normandy two centuries earlier than it appeared in England. It only became

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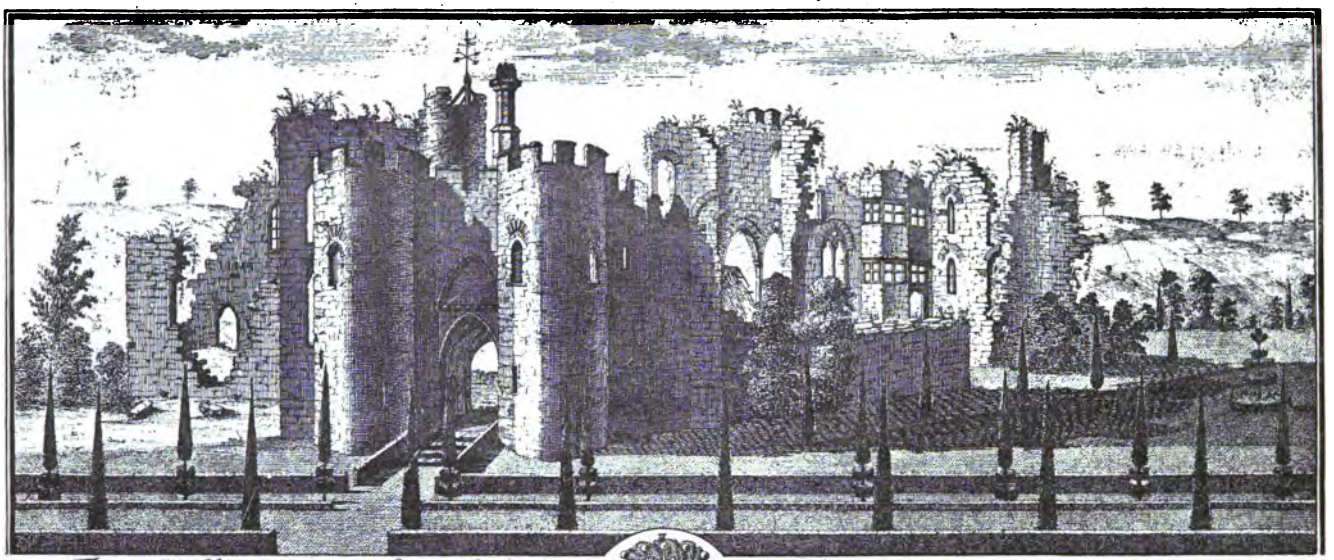
THE SOUTH EAST VIEW OF BROMPTON BRIAN CASTLE, IN THE COUNTY OF HEREFORD.



To the Rt. Hon.ble EDWARD Earl of Oxford and Mortimer, and Baron Harley of Wigmore. Owner of these Remains. This Prospect is humbly Inscribd. by My Lord Yr. Lords.ps most Obed.t & Obligd. Servts. Sam.l & Nath.l Buck.

THIS CASTLE belonged for some Ages to a Family of Distinction call'd Brian de Brompton. In the dats of K. Edw. III.d Robert de Harley married the Daughter & Heir of S.r Brian de Brompton, by which means it came into that Noble Family.

S. & N. Buck Delin. & Sculp. 1731

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common here in the 14th century. It is found in profusion on the tower of the Hereford Cathedral, and on the south windows of Leominster church. Gone is the curtain wall that must have extended right and left of the gateway, set with semicircular towers that projected out into the moat-defences, which, having been used in the time of the Plantagenets, we call Edwardian. Gone is the moat, converted here, as it so often has been, into a faultless bowling green. Gone too is the drawbridge. There is behind the gate a doorway of the hall, which in Tudor days was inclosed by a great oriel, showing that the place was used for pleasant residence as well as for defence. The ruins are set in a grass lawn, and in front of them clustered together the members listening to the following interesting paper on the history of those who occupied them :—

BRAMPTON BRYAN CASTLE: ITS SIEGES AND DEMOLITION.

By the Rev. J. D. La Touche, President of the Caradoc Field Club.

"There seems to be some probability," says Mr. Robinson, in his History of the Castles of Herefordshire, "That the foundation of Brampton Bryan dates as far back as the latter part of the reign of Henry I." Barnard Unspec, Lord of Kinlet, in Shropshire, seems to have been the first of his family who adopted the name of De Brampton, and in 1179 his grandson, Brian de Brampton, is associated with Hugh de Mortimer in establishing the neighbouring abbey of Wigmore. He laid the second stone of the foundation, and granted materials for the work from his woods and quarries. Their descendants remained at Brampton for four generations, when the line ended in two co-heiresses, the elder of whom married Robert de Harley (called by Roger de Mortimer "his beloved bachelor"), and carried the castle and manor into that family. At an inquest in 1293, after the death of the last Baron de Brampton, the castle is described as a tower, with a cartelege garden and vinery, valued at £8. 7s. 8d. per annum.

In the Wars of the Roses the Harleys took the field under the banner of the House of York, and the spurs of knighthood were won by John Harley at Tewkesbury. In the castle were concealed for some time the celebrated Jesuits, Parsons and Campion, (who were put to the torture, and executed shortly afterwards) when upon their secret tour through England in 1580, and great hopes were entertained that they would gain the same influence over their patron's son as they had done over his father, but they failed in doing so. But the chief interest in connection with Brampton Bryan centres in the events of the Civil Wars. The owner was at this time Sir Robert Harley. He was the son of Robert Harley and of Margaret, daughter of Sir Andrew Corbet, of Moreton Corbet, in the county of Salop, and Baron of Wigmore. He was a great agriculturist, and took much interest in improving the breed of cattle. He represented the borough of Radnor in the Parliament of the 1st and 2nd of James, and was a leading and influential member of the Puritan party, was active in the proceedings against Lord Strafford, and was chairman of the committee to

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suppress the use of the surplice and other ornaments, the altar, and the book of sports, and took great interest in, and sympathised much with, the persecuted Protestants of Piedmont. His wife, Lady Brilliana, was the daughter of Sir Edward Conway, of Rugby, in the county of Warwick. She was the cousin of Lady Fairfax, and shared with her a very hearty sympathy with the Republican cause. They had both been brought up in Holland, which fact no doubt strengthened their Puritanical opinions. Lord Clarendon has said of the latter that "she had not that reverence for the Church of England as she ought to have had, and so unhappily concurred with her husband entering into rebellion, never imagining what misery it would bring upon the kingdom." However that may be, days full of sorrow were in store for this poor lady; and in a large collection of her letters, found in a garret of the house now attached to the castle, by the late Mrs. Stackhouse Acton, and which have been published by the Camden Society, a most interesting and touching record has been preserved of the domestic life of that troubled period. These letters reveal the mind of one deeply imbued with a religion which enabled her to bear up bravely against affliction, and to look at the brightest side of what was passing around her. Her constant desire was that no bitterness or revenge should be shown to their enemies, and, in an artless and simple manner, these letters describe the progress of events. They are chiefly addressed to her son Edward, who was then pursuing his studies at Magdalene College, Oxford. For this young man she entertained the most tender affection, and the letters are replete with a good mother's solicitude for his temporal and eternal welfare. They describe from time to time the progress of the siege and the many household cares which occupied her mind. As the blockade proceeds, and the difficulty and danger of communication become greater, they are evidently expressed with more caution. They are sometimes written on pieces of cloth, and in several of them a peculiar devi̧ce was adopted. In order to prevent detection, the true sense of the letter can only be obtained by reading it with a piece of paper perforated so as, when placed over the writing, to disclose only the words which were to be conveyed, the whole making up what she calls a nonsense letter.

The siege of Brampton Bryan took place in the earlier part of the Civil Wars. For more than twelve months before it began there had been threats that the Castle would be attacked. In the winter of 1642 these became more distinct; the farms were burned and the Castle blockaded. It was about this time that Lady Brilliana thus writes—"My dear Ned,—I know it will grieve you to know how I am used. It is with all the malice that can be. Mr. Wigmore will not let the fowler bring me any fowl, nor will not suffer any of my servants pass. They have forbid my rents to be paid; they draw away the young horses at Wigmore, and none of my servants dare go as far as the town; and dear Ned, if God were not merciful to me I should be in a very miserable condition. I am threatened every day by soldiers. My hope is, the Lord will not deliver me nor mine into their hands, for surely they would use all cruelty towards me, for I am told that they desire not to leave your father neither root nor branch. You and I must forgive them. Dear Ned, desire the prayers of the godly for us at Brampton. July 28,

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1642." And farther on—"My dear Ned, my hart has bine in no reste since you went. I confess I was never so full of sorrow. I fear the proviscion of corne and malt will not hoolde out if this continue, and they say they will burne my barnes; and my feare is that they will place soulders so neare me that there will be no gooing out. My comfort is that you are not with me, leest they should take you; but I do most dearely miss you; I wisch if it were so I was with your father. I would have write to him, but durst not write upon paper. Deare Ned, write to me, though you write upon a peace of clothe, as this is. I pray God bless you, as I desire my own soule should be blessed. Theres a 1000 Dragooners come Hereford. 5 owere officers, my Lord Harfords. Your mother, Brilliana Harley, Dec. 13, 1642"

Later on, a council of war decided that the best way to take Brampton Castle was to blow it up. On St. Valentine's Day, 1643, Lady Brilliana writes:—"The Sheriff of Radnorshire, with the trained bands of that county, and some of the Herefordshire soldiers, mean to come against me. My Lord Herbert had appointed a day to come to Presteign, so that his presence might persuade them to go out of their county. He had commanded them to bring pay for victuals for ten days. The soldiers came to Presteign, but it pleased God to call my Lord Herbert another way. So they will starve me out of my house. They have taken away all your father's rents, and now they will drive away the cattle, and then I shall have nothing to live upon; for all their aim is to enforce me to let the men I have go, that then they may seize upon my house and cut our throats by a few rogues, and then say they knew not who did it."

The siege was regularly commenced on the 25th July, 1643, by Sir William Vavasour with a force of 600 men. It lasted for about six weeks, during which Lady Brilliana was blockaded in the castle with her children and neighbours, who resorted thither to keep themselves from the plunder and violent usage then in practice among the Cavaliers. Sir Robert was at this time in London, attending to Parliamentary duties, and her eldest son at Oxford. In this extremity her faithful adviser and friend was a Dr. Nathaniel Wright, a physician of Hereford, who now with his wife took up his quarters at Brampton Bryan, and devoted himself and his money to the cause. The rest of the garrison consisted of her servants and Sergeant Hackluit, a veteran soldier who had been sent to her by Col. Massey from Gloucester. "The first stroke of the Cavaliers was upon a poor aged blind man, who was without any provocation killed in the street." During the siege the cook was killed by a poisoned bullet, and a running stream that supplied the village was poisoned. The church, parsonage, and dwelling-houses, together with the mill (about a quarter of a mile off) and the buildings belonging to the castle were all destroyed, but it does not appear that the castle itself was much injured, or that there was much loss of life. It was, in fact, a blockade.

Nothing serious had been done towards reducing it before the 22nd August, when Sir William Vavasour was summoned to Gloucester to join the King. On the 25th of August Lady Brilliana thus writes: "Mr. Phillips has taken a great deale of pains and is full of courage, and so is all my houses, with honest Mr. Petter and good Dr. Wright, and Mr. Moore, whoo is too much comfort to me. The

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Lord direct me what to doo; and deare Ned pray for me, that the Lord may preserve me from my cruell and bloodthirsty enemies."

Upon the departure of Sir William Vavasour, Colonel Lingen, a zealous Royalist and opponent of the Harleys, took the command, but he had to withdraw on the 6th September, when authentic news came of the Royalist disaster at Gloucester. Poor Lady Brilliana, who was of a delicate constitution, and enfeebled by the troubles and anxieties of the siege, shortly after this took cold, and died after a few days' illness. She left three sons and two daughters, all baptised at Brampton Bryan. Early in 1644 a fresh force, under the command of Sir Michael Woodhouse, who had just taken Hopton Castle, attacked the Castle with superior skill. Dr. Wright, Sergeant Hackluit, and 70 men gallantly defended it as before, but the walls could not stand the artillery brought to bear upon them; and when the outworks had fallen, the garrison was compelled to surrender at mercy. A contemporary account tells us that the walls were battered even with the ground, leaving little else but cellars. The prisoners included Dr. Wright, Sergeant Hackluit, and Sir Robert Harley's three younger children. What was done with the prisoners does not appear, except that they were afterwards in Shrewsbury in prison; but the tide of success had turned, and the next year, after the battle of Naseby, Herefordshire was in the hands of the Parliament. A list of Sir Robert's losses shows that they were assessed at £12,990. Parliament authorised him to recover this sum from Sir Henry Lingen; accordingly, Edward Harley (Sir Robert's son) waited on him, and, as he was, for some reason, absent, saw his wife and enquired whether the numbers had been set down by her husband, and on receiving an answer in the affirmative, he returned the schedule, waiving all right and title to the estates, which were by it conferred upon him—a worthy son of a good mother, whose constant counsel to him had ever been to show a forgiving and generous spirit to their enemies.

There are no traces of the original tower, but it may have stood on the western side, where some fragments of an old wall may be seen. The gateway, from traces of ball-flower ornament which still exist, may be assigned to the age of Edward III. Leland speaks of this castle as a "pyle." The following extract is from a sermon preached at the funeral of Sir Robert Harley in 1657:—"When after the wars Sir R. Harley returned into the country and came to see Brampton Bryan, he rode towards the castle gate, and seeing the ruins, put off his hat and said "God hath brought great desolation on this place since last I saw it. I desire to say, the Lord hath given and the Lord hath taken away, and blessed be the Name of the Lord; in His good time He will raise it up again; when His house is built, God will, I trust build mine.' And observe that he took good care to build this house or place of worship, and let his own lie buried in its woeful ruins." In the modern building was born Edward Harley, auditor of the inquest, to whose piety and public spirit Herefordshire is much indebted. Here, too, the first and most illustrious of the Earls of Oxford and Mortimer died in 1724, carrying with him to the grave a reputation which, to use the phrase of Clarendon, *Vituperare ne inimici quidem possunt, nisi simul laudant.*

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It was an old tale, but well told and always interesting—Dear, good, brave, loving Lady Brilliana! "Most noble lady and Phœnix of women," as she was called "most faithfull and affectionat wife and mother," as she signed herself in scores of letters. She has made this quiet corner of the country classic ground, and if it had ever struck her to spell the same word twice alike, her wonderful orthography might have been counted classic English to day. It was a real pleasure to be shown her original letters, so teeming with love, and faith, and courage, and read them a little through the hole that made the "nonsense" into sense. But the word "forward" from a voice that no member of the club disobeys, drew the members to the Church close by. Rebuilt when it was, it is of course a debased classical type, but most curious withal. Its oaken roof is carried on columns with bits of real cornice, all of oak, standing up against the walls, very much like the plainer work in the church at Vowchurch in the Golden Valley, which the Club visited a few weeks since. There is a tradition that this was the old oak roof of the Castle Hall, but there are many similar traditions, and one wonders how the transplanted roofs came to fit in their new places so well! There is, however, a date on it somewhere, and perhaps the matter can be made sure. A couple of good early floor tiles found at the castle, and carefully preserved, may have belonged to the castle chapel or to this church.

Luncheon had been most kindly and unexpectedly provided for the members, and in this interval may be told the best botanical "find" of the day. It was just where one would wish it to be. Dr. Chapman gathered from the ruins of the castle, *Dianthus plumarius*, the first time this pretty pink has been found in Herefordshire, although it grows on some Shropshire ruins, and the locality would not be so openly given now if it were not luckily in a situation that will save it from extermination. To the consternation of some gentlemen, pleasantly lingering at the hospitable table, the cry of "Forward" was again heard from that tiresome martinet of punctuality, and the road was taken for Upper Pedwardine to visit the Tremadoc shales. The road has been cut through thin soft beds of sandstone standing almost on edge, which were a puzzle to geologists, until the Rev. Wm. Symonds found in them the fossil *Dictyonema sociale*, which determined the particular strata of rocks to which they belong, here tilted up by the great fault which runs through the park of Brampton Bryan. Dr. Callaway has studied these strata and proved them to be very much older than had before been supposed. In his absence the Rev. J. D. La Touche thus told of his work at the request of the President.

Murchison and the Geological Survey had described all the area East and South of the Longmynds as representing a regular succession of strata from the Caradoc to the coal measures on the Clee Hill, never suspecting that there was any considerable break in the series. A few years since Dr. Callaway began his researches near Wellington, and was surprised at the resemblance of the fossils found at Shineton to those in what are called the Tremadoc beds. The Tremadoc succeed the Lingula flags of Wales and underlie great deposits of the Arenig, the Llandeilo, the Caradoc, &c., and therefore their proper position would be hundreds or even thousands of feet below the rock with which they are found

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to be here associated, if Dr. Callaway is right. His supposition involves an enormous interval of time between the deposition of these strata, occupied in faultings, upheavals, and overlayings. It is no doubt a startling hypothesis, but the fact that in all observed cases these Pedwardine (Tremadoc?) beds are found inclined at a very considerable angle to the Llandovery sandstones which lie over them, implies this vast interval. At Shineton the beds dip at an angle of 30 deg., and at Pedwardine, 30 miles from that place, at not less, whereas the Llandovery lie nearly horizontal across their edges. Dr. Callaway finds at Shineton the following fossils which are characteristic of Tremadoc or earlier strata:— Conocoryphe monile, Olenus Salteri, Agnostus dux, Obolella Sabrinæ, Asaphus Homfrayi and A. Croftii, and here at Pedwardine, Dictyonema Sociale and Lingulella Nicholsoni. Dr. Callaway identifies these shales with the strata found at Malvern, and to the west of the Stiperstones. There is reason to believe that these views have been at length accepted by the Geological Authorities. The shales were soft and easily separated, and many specimens of Dictyonema were found, but nothing else. "Forward" was again the cry, and up the steep lane the party proceeded. It was soon found to widen and open out a picturesque view near and distant. Yon bit of farm building, with tall trees and rustic gate, and water rippling on the road, must have been designed by Birket Foster! Whilst the wood of tall slender trees, with the coppice below, and the distant view, is surely an unblushing copy from Linnell!

The warm rain of the last ten days had awoke up fungus life. An enormous *Polyporus Squamosus* some two feet wide, sprung out from the trunk of an ash tree, but as no one wanted razor strops for which the fungus has a high repute, it was passed by. *Boletus luridus*, most poisonous of all, grew under an oak tree; that too was rejected, since no one seemed inclined to commit "a despatch," which would certainly not be "happy." In the pretty wood on the summit of the hill the chanterelle, *Cantherellus cibarius*, with its pleasant smell of ripe apricots, was gathered, and so too was *Russula heterophylla*, edible and good, though its greenish purple tints make the vulgar world afraid of it.

In the open space of a cross riding in the wood was a bare pole, set up with the steel trap so fatal to hawks. In it was a beautiful Nightjar, or Fern-owl, *Caprimulgus Europœus*. It had only been caught the previous night, for the lustre of its beautiful eye was scarcely dimmed. These birds come to us from Africa, and are happily more common in Herefordshire than is generally supposed. In the wooded districts of the country, the peculiar jarring noise they make, like the sound of a spinning wheel, may be heard on any calm evening in early summer. They live almost entirely on cockchafers and moths, whose colour they so much resemble. They thus render good service to the woodman and the agriculturist, consuming the source of innumerable destructive grubs and caterpillars. The trap was not set for this poor bird, and an unlucky capture it was. If its relatives could but know that its remains were carried off for preservation, it might be a source of some slight consolation.

The park railings were reached at length and scaled by some of the members. What fence can stop Woolhopeans? And the whole party were soon clustered

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on the highest point of the hill, where a station of the new Government Survey was found. From the pocket instrument carried by the Rev. H. B. D. Marshall, the height of this spot was found to be nearly 500 feet above Bucknell Station, which was about 300 feet above Barr's Court Station level, and thus the highest point in Brampton Bryan Park is some 960 or 980 feet above sea level, an approximation which must serve until the precise details are published by the Government Survey. The magnificent scenery from this spot would take long to describe. It must be seen to be realised. Time did not admit of a descent down the southern dingle of the park by the magnificent wych elm at its head (whose measurement stands in the archives of the club at 18ft. 8in. in circumference at 5ft. from the ground), nor could the oaks, sweet chestnuts, or beech trees be visited. However, the commissioner of the club was there some fourteen years ago, and a few passages from his report in the transactions of 1870 will be interesting now. Brampton Bryan Park is noted for its fine timber, its varied scenery, and above aud beyond all, perhaps, for the great number and variety of its picturesque trees. A wise judgment here leaves the beauty and grandeur of tree growth to be well contrasted with the wild havoc of the storm; so that the pleasure of a ramble up its steep slopes, or through its shady dingles, is greatly heightened by the lesson so quietly enforced

Shadow and shine is life, flower and thorn.

The thoughtful mind sets itself intuitively to read the record of centuries written here, and tries to trace the effects of that violent storm of September 3rd, 1658, at the time of Cromwell's death, which is known to have been very destructive here, breaking and uprooting the trees in a broad band across the whole park. Clarendon and all historians noticed this violent tempest, which seemed, indeed, as if

Nature herself took notice of his death.

And his partizans and his enemies did not fail each to interpret it as a confirmation of their own particular prejudices. Waller, in his poem on the death of the Lord Protector, says for his friends :—

> We must resign. Heaven his great soul does claim,
> In storms as loud as his immortal fame;
> His dying groans, his last breath shakes our isle,
> And trees uncut fall for his funeral pile.

The Royalists read this great disturbance of the elements in rather a different sense, and in this particular locality the saying has come down that "the devil dragged Oliver Cromwell across Brampton Bryan Park to spite the Harleys." Sir Edward Harley, then in posssession of the estate, though himself a Roundhead, quarrelled with Cromwell on the King's death, and they became bitter enemies. After the great storm which occurred when he died, Sir Edward wrote to a friend—"I wish the devil had taken him any other way than through my park, for not content with doing me all the mischief he could while alive, he has knocked over some of my finest trees in his progress downwards." The tradition still remains that ever since that period, on one day in the year, the devil still rushes across Brampton Bryan Park. Be this as it may, no Satanic influence marred the pleasure of the club's visit on this occasion; nor was it likely, said one clerical member, that it would do so on St. Peter's day. Had he taken this day

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for his visit, said another loiterer, he would assuredly have been saluted by energetic cries of "Forward," "Forward," from amidst the bracken ahead. The members visited the grand old oak, the "Laugh-lady Oak," growing on the hill side of the "Laugh-lady Dingle." This remarkable tree may have met with the great misfortune of its life from the great storm at Cromwell's death. Its top has been broken off, its bole has been riven asunder, and it now presents a hollow stem divided into three sections, but each one has so far recovered itself as to be everywhere luxuriant. Seven bullocks were lost in a snowstorm some years since, and after a long hunt for them they were all found together within the hollow of this tree, where they had taken refuge and were unable to extricate themselves. On the Commissioner's visit 14 years ago the bole measured, at 5ft. from the ground, the large circumference of 30ft., but, he observed, "the measurement is not true, since the rent on two sides reaches the ground, and one of them gapes widely." This remark has been well borne out, for on the present occasion the circumference was found to have increased to 40ft. 10in., whilst the inside measurement of the hollow bole gave the diameter of 9ft. 3in., better room than before for seven beasts to shelter themselves. The picturesque dingle in which this tree grows is called "Laugh-lady Dingle," and a beautiful spring of water which flows out in a pretty romantic spot below is called "Laugh-lady Well." The clear, beautiful water rushes out joyously in a full and rapid stream, and sometimes a gentle gurgling noise is heard from within its source. The belief is general in the district that if a pin is dropped into it and bubbles arise the wishes or vows then made will be granted, and this is the more to be relied on if a gentle gurgling noise from the spring greets the expectant lover's vows. An old fogie present did drop a pin in then and there, and bubbles did arise in plenty, so the good Naiad of the spring was highly propitious, but no gurgling sound was heard, and why should there be? What good could come of it , . . since the old fellow had been married a whole generation back! One gentleman wondered if the ample supply of sparkling bubbles that kept arising were Light Carburetted Hydrogen. This could not be the poet so much wanted here! The eye that could speculate on the contents of such bubbles is not

> The poet's eye in a fine frenzy rolling,

nor is the hand that would catch and analyse them one that could hold the right sort of pen for the locality—

> As imagination bodies forth
> The forms of things unknown, the poet's pen
> Turns them to shapes, and gives to airy nothing
> A local habitation and a name.

In the marsh at the bottom of the dingle the more rare plants found were *Myriophyllum alterniflorum*, *Callitriche hamulata* and *C. platycarpa*, *Catabrosa aquatica*, *Alopecurus fulvus*, *Festuca pratensis var. loliacea*, *Helosciadium inundatum*, and in many places throughout the day

> By rivulet or wet road-side,
> That blue and bright-eyed flow'ret of the brook,
> Hope's gentle gem, the sweet Forget-me-not.

but it was the less common creeping variety, *Myosotis repens*. *Jasione montana* was gathered in Pedwardine Wood, *Trifolium striatum var. erectum* was also

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found, and *Viola utricolor* and *Ornithopus perpusillus* had been brought from the Forest of Deerfold and Berkely Knoll, both within sight. In the waters of Laugh-Lady Well itself a moss was found growing, which it is hoped will turn out to be new to the county; *Hypnum speciosum*, a moss the Rev. Augustin Ley has been hunting for for years. At the end of the park the members took leave of the host and hostess whose courtesy and company had given so much pleasure to their visitors throughout the day. The sirloin of beef was waiting for them at the Sitwell Arms, of excellent quality, well cooked, and well served, and it was done justice to. Some brief complimentary speeches were made, and an appeal was made to the members—and we make it now to our readers—to send the particulars of any attempt to obtain coal in Herefordshire, to Mr. Theo. Lane, Broomy Hill, Hereford, that a paper may be drawn up for the transactions of the club, for future reference. Mr. Cocking and Mr. Charles Fortey, Ludlow, had most kindly brought a collection of fossils of the Cambrian rocks for exhibition. From the Lower Lingula Flags—*Microdiscus*, *Theca*, *Agnostus*, and *Lingula plumbea*; from the Upper Lingula Flags—*Dictyonema sociale* and *Lingula Davisii*; from the Tremadoc slates—*Angela Sedgwickii*; from the Lower Llandeilo rock—*Æglina*, *Trinucleus fimbriatus*, and *T. Murchisoni*, and *Lingula Philipsii*; and from the Upper Llandeilo rocks—*Lingula Ramsayii* and *L. attenuata*, *Agnostus McCoyii*, and *Ampyx nudus*.

The examination of these interesting fossils lightened pleasantly the railway journey. The Rev. J. D. La Touche brought specimens of *Astrantia major* from Stokesay Wood, a noted locality for this rare plant. Distant botanists welcomed it gladly.

It is a very hopeful sign of the club's progress to find its younger members keeping pace with the times. The Rev. F. S. Stooke-Vaughan and Messrs. C. B. Beddoe and E. Griffith Morris took many photographic pictures during the day. Photography should greatly aid the work of the Woolhope Club.

NOTES ON THE PEDWARDINE SHALES,

By C. Callaway, Esq., Sc.D., F.G.S., &c.

The *Dictyonema*-beds at Pedwardine occur in a hollow lane, and are exposed in the bank on each side. They consist of olive-green fissile shales, dipping at an angle of about 45°, and are overlain by nearly horizontal strata of May-hill sandstone (Upper Llandovery of Murchison). The shales contain, besides *Dictyonema sociale*, a fair abundance of the Brachiopod, *Lingulella Nicholsoni*. By means of these fossils, a swell as by the lithological characters, these beds are correlated with the *Dictyonema*-shales of Malvern, and with the Shineton Shales. The Shineton Shales occur in force on the tributaries of Severn, near the Wrekin, and have yielded a rich fauna of Trilobites and other fossils, by which the formation has been proved to be of Tremadoc (Upper Cambrian) age. At Shineton and at Pedwardine, the shales are close to the Great Fault which runs in a south-westerly direction through South Shropshire.

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Woolhope Naturalists' Field Club.

JULY 25TH, 1882.

BRECON AND THE BRECON BEACONS.

"Brecon . . . built as in a pit it were,
By waterside all lapt about with hill,
You may behold a ruinous castle there,
Somewhat defaced—the wall yet standeth still,
The river Usk and Honddu run thereby."

CHURCHYARD.

THE Woolhope Club has again been most fortunate. Fine weather has graced its "Ladies' Meeting," and a most enjoyable day has been again added to the pleasant records of the Club. This season had so long been wet and fickle that ladies might well be timid to undertake a mountain excursion. The morning, however, was fine, and the railway carriages provided soon began to fill with the members and visitors. Mr. Blashill, the President, was the first to arrive. Then came Dr. Bull, Miss Evelyn and Miss Maude Bull, Mr T. Llanwarne (Mayor of Hereford), Mr. H. C., Mr. C. B., and Miss Sophia Beddoe, and the Misses Marion and Kate Beddoe, Rev. Charles and Mrs. Burrough, Rev. F. T. Havergal, Miss, and Miss Beatrice Symonds, Mr. Arthur Armitage and Miss J. Armitage, Mr. George H. Hadfield, Mr. W., Mrs. Armitage, and Miss Edwards, Mr. and Miss Du Buisson, Mr. J. Griffith Morris, Mr. James Davies, Mrs. and Miss Davies, Mr. John and Mrs. Docking, Mr. F. R. Kempson, Dr. Chapman, Mrs., Miss, and Miss Laura Chapman, Mr. T. D., Miss, and Miss Ann Burlton, Mr. G. H. Phillott, Rev. C. Davies, Mr. P. C. Cleasby, Mr. Chas. Myer, Miss Myer and Miss Moseley, Rev. W. D. V. Duncombe, Mr. A. J., Mrs., Miss Purchas, and Mr. Henry Purchas, Mr. A., Mrs. Levason, and Miss Robertson, Rev. G. M. Metcalfe, Mr. T. C. Paris, Mr. and Miss Shaw, Mr. T. Salwey, Rev. T. A. Stoodley, Mr. William Hebb, Mr. W. Cheiake, and Mr. Theo. Lane. At Credenhill Mrs. Hedley joined; at Moorhampton, Rev. W. R. and Mrs. Shepherd, Rev. H. B. D. and Mrs. Marshall; at Eardisley, Mr. E. H. Greenly, Mr. J. W. Lloyd and Mrs. Linacre; at Hay, Dr. Hincks and Mr. W. A. Swinburne. At Glasbury, Rev. W. Jones Thomas, Misses Thomas (3), and Miss Watkins, and it will be better to say at once that at Brecon the party were joined by the Rev. Rees Price, vicar of St. David's, Miss Morgan, Mr. H. Thomas, Mr. E. C. Phillips, Mrs. and Miss Phillips.

The usual business of the Club was conducted in the train, four fresh members were elected by ballot and two others proposed, and some other matters were discussed. By the time this was done the train had carried its visitors past Clifford Castle, the residence of Fair Rosamond, into the pretty scenery of the

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Wye Valley and the Black Mountains beyond Hay. Here was Talgarth and Mynydd Troed visited by the Club in 1866 with such enjoyment that the memory is pleasant still. Here was Llangorse Lake, where the Club discovered that its large island was purely artificial, a lake crannoge. Are not all these things written in the Club's Transactions?* Whilst talking of these matters and admiring in the distance the Beacons, which it was the main object of the day's excursion to surmount, the train arrived at Brecon station. Here came the only *contretemps* of the day, and that was the serious one of a want of sufficient carriage conveyance. Little Rhayader last year found carriages enough for 120 persons, but it seems that though "All Brecon had been ransacked for carriages," as the Castle Inn superintendent said, it could only find sufficient for 45 persons! Ample notice had been previously given, and it is difficult to know why so provoking a mischance should have happened. Could it be want of business energy, or narrow-minded rivalry, that disappointed some 25 or 30 visitors so much? Any way, it was not creditable to the capital of the county, and not encouraging to future visitors. Such carriages as there were the most energetic soon seized upon and started for the Beacons. Some few gentlemen walked there, and the rest remained to visit the interesting objects and localities at Brecon, under the kind guidance of the Rev. Rees Price, who did all that local knowledge and good nature could do to interest and console the unfortunate, and, it is only just to say, with much success. The drive to the inn at the foot of the Beacons was a long pull against the collar for nearly nine miles up the valley of the river Tarrell. It was a beautiful drive, becoming more and more so as the road ascended and the tree foliage was left behind. The carriages were left at the inn and the walk to the summit began. The little mountain stream, swollen by the late rains to a size that demanded respect and care, stopped a matron or two of the party and amused the younger ones to get over. Few did it without wetting their shoes if nothing more, but this mattered not much, for the mountain side was rather boggy and wet from the same cause. The walk to the summit is nearly two miles. It seemed three to some of the party, but it is nowhere either steep or difficult, and the well-known view from the top is an ample reward. The heights attained throughout the day were carefully registered from the pocket aneroid, by Mr. C. G. Martin and Dr. Chapman. Tal-y-lyn was 460 feet above sea level. Then leaving the watershed of the river Wye for that of the river Usk, Brecon station was found to be nearly 200 lower than that of Tal-y-lyn. The little inn at the foot of the Beacons was 1,400 feet above sea level —and the summit of the highest, the southernmost of the two peaks, was 2,625 feet above sea level—both instruments agreed in this result, and therefore the height of 2,862 feet, as commonly given for the Bannau Breconheiniog, or Brecon Beacons, is probably too high. As soon as the stragglers of the party had arrived on the summit, the president called on Dr. Bull to read his paper. Seated on the cairn of Cadyr Arthur, or King Arthur's chair, he began as follows :—

* *Wool. Trans.* p. 150, 1866.—See also Paper, and illustration of crannoge on p. 101, *et seq.* of *Trans.*, 1870.

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A LOCAL HISTORICAL LEGEND.

The county of Brecon derives its present name from Prince Brychan, who ruled in this district A.D. 400, and who died in 450, or thereabouts. This part of the Principality of Wales was called from him the land of Brychan, or in the language of the country Brechiniauc, Brechiniowy, Brechinioc, or Brecheiniog, according to the orthography, or fashion, prevailing at different periods of history. The more ancient name of the county was Garthmadryn (meaning Foxcliff, or Foxhold), but this is only now mentioned to state that Trwdrig, the last ruler of Garthmadryn had one only daughter, Marchella, whom he sent over to Ireland to avoid a dangerous pestilence that was raging in the Principality at that period. He sent her in great state, though the emergency was so sudden. There were 300 men to protect her, and twelve honourable maidens to wait upon her, and intelligence of her approach was forwarded to Ireland. How they crossed the channel, history sayeth not, but on their arrival, Aulac, the son of Gormac, the king of the country, met her with a princely train. He was at once smitten with her beauty, soon married her, and made honourable provision for her twelve maidens by giving them also in marriage to lords of his country. Brychan Brecheiniog was the son of this marriage, and he was brought, as had been previously arranged, into the Principality to be educated and to rule. That learned work, Jones's "History of Brecknock" (to which this paper is greatly indebted), states that there are at least seven or eight pedigrees of Prince Brychan most skilfully drawn out, but their interesting details and their many variations may not be entered into by a Saxon reader to a Saxon audience—but this is the less necessary since it is neither the history of Breconshire, nor the life and adventures of the prince that are now dealt with. It must suffice to say that Prince Brychan became a valiant, brave, and wise man, who overcame all obstacles opposed to him, and ruled so supreme in this portion of the Principality that it has ever after borne his name. He married three wives and had a numerous progeny of sons and daughters, legitimate and illegitimate—some say as many as 40 sons and 26 daughters. Many of them embraced a religious life and became saints and saintesses (to keep the translation literal) of high celebrity, and what is quite certain is that many of the churches in the Principality, which exist at the present day, were dedicated to one or other of them. "Quibus passim per Cambro-Britaniam," says Giraldus, "templa et divorum et divarum nomina inscribantur." The name of Brychan's wives and the names and good deeds of many of his sons and daughters are to be found variously given in the Welsh M.S. of Llewellyn Offeiriad, in the archives at Jesus College, Oxford; the Harleian MSS. in the British Museum, and at the Herald's College, to which sources of information all those who may wish to study the details of the family history are respectfully referred.

It should be stated, however, that several of them went to live in the counties of Devon and Cornwall; and some also went to Ireland, at that time renowned for its religious faith and teaching. Prince Brychan's daughters became even more renowned than his sons, and each seems to have surpassed the

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preceding ones. The Princess Dwynwen, his 26th and last daughter, became a devotee of such grace and beauty that she was considered a Welsh Venus, or Goddess of Love. The church of Llanddwyn, in Anglesea, is dedicated to her. Her shrine was much resorted to by desponding swains and love-sick maidens. The poet David-ap-Gwylym, in his long "Invocation to Dwynwen," says—

A thousand altars in her temple smok'd,
A thousand bleeding hearts her pow'r invok'd.

On the present occasion, however, your attention must be confined to the history and sanctity of the 25th daughter of Prince Brychan. Her name was Cenai, Cenau, or Ceyna. Cressy, the Benedictine, has given an account of her, which is to be found in the "English Martyrology." She was a beautiful creature, tall, graceful, and fascinating. It is said of her in Capgrave: "When she came to ripe years many noble persons sought her in marriage, but she utterly refused that state, having consecrated her virginity to Our Lord by a perpetual vow. For which cause she was afterwards, by the Britons, called Keyn-wiri, that is, Ceyna the Virgin. Tormented by such attentions, at length she determined to forsake her country and find out some desert place where she might attend to contemplation. Therefore, directing her journey beyond Severn, and there meeting with certain woody places, she made her request to the prince of that country that she might be permitted to serve God in that solitude. His answer was, that he was very willing to grant her request, but that place did so swarm with serpents, that neither men nor beasts could inhabit in it. But she constantly replied, that her firm trust was in the name and assistance of Almighty God, to drive all that poisonous brood out of that region. Hereupon the place was granted to the Holy Virgin; who, presently prostrating herself in fervent prayer to God, obtained of Him to change all the serpents and vipers there into stones. And to this day the stones in that region through all the fields and villages do resemble the windings of serpents, as if they had been framed so by the hand of the engraver." A similar miracle is also related of St. Hilda, at Whitby, in Yorkshire. This place is now known as Keynsham, in Somersetshire, between Bath and Bristol, and Camden, the learned antiquary, notices this story, and says that "an abundance of that fossil termed Cornu Ammonis (or ammonite) is frequently dug up," and then in all simplicity he calls them "miracles of sporting nature." He himself saw one dug up from a quarry, which he says "represented a serpent rolled up into a spire, the head of it stuck out into the outward surface, and the end of the tayle terminated in the centre." Fine examples are now to be seen over the doors of many houses there, and fragments are common amongst the stones broken up to mend the roads. Cressy says—"The Princess Ceyna spent many years in this solitary place, and the fame of her sanctity everywhere divulged, and many oratories were built by her." She left there a beautiful spring of water in great repute for the cure of bad eyes and other diseases. From this place she seems to have gone into Cornwall, where so many of her relatives had already established themselves. Here she took up her residence in the parish of St. Neot, and some time afterwards here she was found by her nephew St. Cadoc, or St. Cattwg the wise, the son of

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Gwladis, Prince Brychan's eldest daughter. He, "when performing a pilgrimage to the Mount of St. Michael, met there with his blessed aunt, St. Keyna, at whose sight he was replenished with great joy, and being desirous to bring her back to her own country, the inhabitants of that region would not permit him. But afterwards, by the admonition of an angel, the holy maid returned to the place of her nativity, where, on the top of a hillock, seated at the foot of a high mountain, she made a little habitation for herself, and, by her prayers to God, obtained a spring there to flow out of the earth which, by the merits of the Holy Virgin, afforded health to divers infirmities."

St. Keyna, after her return from Cornwall, seems to have remained in Breconshire. She built herself a small chapel or oratory at St. Cenau, called when the chapel was built Llangenau, and now usually called Llangenny. The parish adjoins Crickhowell. The situation of the chapel was marked by the finding of the bell used to call the neighbours to prayers. It was dug up a few years since on a farm, eastward of the present church, called Pen-y-daren, on the summit of a rocky knoll, as its name signifies. The bell was eleven inches high, with square sides and a very broad mouth, but much corroded and without its clapper. There was a considerable heap of stony rubbish where the bell was found, but no vestige of the walls of the oratory remained, and even the rubbish has now been cleared away. Near this spot, also, is *Ffynnon Genau*, or the well of St. Cenau, celebrated also for its medicinal virtues. Here she ended her days "when the times of her consummation approached," says Cressy. One night, she by the revelation of the Holy Ghost, saw in a vision as it were a fiery pillar, the base whereof was fixed on her bed; now her bed was the pavement strewed over with a few branches of trees. And in this vision two angels appeared to her, one of which approaching respectfully to her, seemed to take off the sackcloth with which she was covered, and instead thereof to put on a smock of fine linen, and over that a tunic of purple, and last of all a mantle all woven with gold; which having done he said to her, "Prepare yourself to come with us, that we may lead you into your heavenly Father's kingdom." Hereupon she wept with excess of joy, and endeavouring to follow the angels she awoke, and found her body inflamed with a fever, so that she perceived her end was near. Therefore, sending for her nephew Cadocus, she said to him, "This is the place above all others beloved by me; here my memory shall be perpetuated. This place I will often visit in spirit if it may be permitted by me, and I am assured it shall be permitted me because Our Lord has granted me this place as a certain inheritance. The time will come when this place shall be inhabited by a sinful people, which, notwithstanding, I will violently root out of this seat. My tomb shall be a long while unknown, till the coming of other people whom by my prayers I shall bring hither: them will I protect and defend; and in this place shall the name of Our Lord be blessed for ever." After this, her soul being ready to depart out of her body, she saw standing before her a troop of heavenly angels, ready joyfully to receive her soul and to transport it without any fear or danger from her spiritual enemies, which having told to those who stood by, her blessed soul was freed from the prison of her body on the eighth day before the Ides of October. In her dissolution her face smiled,

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and was all of a rosy colour, and so sweet a fragrance was exhaled that those who were present thought themselves in the joy of Paradise. St. Cadocus buried her in her own oratory, where for many years she had led a most holy mortified life, very acceptable to God,—*Ch: History of Brittany*—and for many generations the festival of St. Cenau, or St. Keyna, was held in honour of the Virgin Saint on the 8th October, in the parish of Llangenny. The feast, or parish wake, is now held in June, annually, upon St. Curig, commonly called Curig Llwd, or Grey Curig's day. It will be observed that wherever St. Keyne established herself there a beautiful spring of water is to be found—at Keynsham, at St. Neot in Cornwall, and here at Llangenny, and each of them has the repute of high medicinal virtues, carried down from remote antiquity. It is a pretty fancy that thus attaches the name of a holy person to a bright spring of water, a tribute at once to the purest devotion of the saint and the highest gratitude of the people. But these wells of St. Keyna had another very remarkable property. It seems this charming saint—though she so rigidly shunned matrimony herself—ever kept an eye on the concerns of the marriage state, and in a playful irony, we must suppose, since envy, or jealousy, or revenge are out of the question, she threw a spell upon the water. St. Keyna's wells have the singular effect that the first of a new married couple who drink of their waters obtains the command in the household for life. The Welsh seem nearly to have forgotten their saint and her well too. At Keynsham it is only the efficacy of the spring in curing weak eyes and other disorders that is remembered, but at St. Neot in Cornwall the case is far different. They know little of the saint to whom it is dedicated, but they value the spring for the ruling power its waters are reputed to confer. "The well is arched over," says Fuller, "with the robes of four kinds of trees, withy, oak, elm, and ash," and its special virtues will be best described by Southey's lines upon it, including, as they do, the lines previously written by less gifted poets:—

A well there is in the west country,
And a clearer one never was seen;
There is not a wife in the west country
But has heard of the well of St. Keyne.

An oak and an elm tree stand beside,
And behind doth an ash-tree grow;
And a willow from the bank above
Droops to the water below.

A traveller came to the well of St. Keyne,
And joyfully he drew nigh;
For from cock-crow he had been travelling,
And there was not a cloud in the sky.

He drank of the water so cool and clear,
For thirsty and hot was he;
And he sat down upon the bank
Under the willow-tree.

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There came a man from the house hard by
At the well to fill his pail;
On the well-side he rested it,
And he bade the stranger hail.

"Now, art thou a bachelor stranger?" quoth he,
"For an if thou hast a wife,
The happiest draught thou hast drank this day
That ever thou didst in thy life.

"Or has thy good woman, if one thou hast,
Ever here in Cornwall been?
For an if she have, I'll venture my life
She has drank of the well of St. Keyne."

"I have left a good woman who never was here,"
The stranger he made reply;
"But that my draught should be the better for that,
I pray you answer me why?"

"St. Keyne," quoth the Cornishman, "many a time
"Drank of this crystal well,
And before the angel summon'd her
She laid on the water a spell.

"*If the husband of this gifted well*
Shall drink before his wife,
A happy man thenceforth is he,
For he shall be master for life.

"*But if the wife should drink of it first*
God help the husband then!"
The stranger stoop't to the well of St. Keyne,
And drank of the water again.

"*You* drank of the Well I warrant betimes?"
He to the Cornishman said:
But the Cornishman smiled as the stranger spake
And sheepishly shook his head.

"I hastened as soon as the wedding was done,
And left my wife in the porch;
But i'faith she had been wiser than me,
For she took a bottle to church."

Tradition has not handed down any such disturbing spell as attached to the well at Keynsham, or to the Ffynnon Genau at Llangenny; at least it has not been publicly proclaimed; but there are those who, knowing something of the domestic concerns in these districts, observe in certain households, here and there, "a mastery" so decided and overbearing, that it could not well be greater, however freely the waters of St. Keyne might have been drunk.

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The view of the county of Brecon you see before you gives an excellent idea of its richness and interest. Poetry and romance are necessarily allied to such varied beauty of scenery. It has often been observed that this country is celebrated for the numerous streams which arise amidst its mountains. Springs, streamlets, brooks, rivulets, and rivers abound on all sides, and their names, in the expressive language of the country, always convey some meaning, which, if not descriptive of the stream itself, usually has reference to some person or some event of local interest.

The poet Michael Drayton gives a pretty allegorical conceit with reference to their origin in these lines, albeit a little varying in detail :—

"Brecknock, long time known a county of much worth,
Unto this conflict brings her goodly fountains forth,
For almost not a brook of Morgany or Gwent
But from her fruitful womb do fetch their high descent :
For Brecon was a prince once fortunate and great,
Who, dying, lent his name to that his noble seat,
By thrice twelve daughters blessed by one and only wife,
Who, for their beauties rare and sanctity of life
To rivers were transformed, whose presence doth declare
How excellent they were, by being what they are."

The Legend created much amusement and helped to draw attention from the damp mist of a passing cloud that at the time enfolded the visitors and the summit of the mountain. It did not really rain at the top, but it is curious to notice that it was afterwards found that it had done so slightly at the inn at the foot of the mountain, and still more abundantly at the fir wood lower down. The President thanked Dr. Bull for his paper, and wondered that he should have found out that the Cornish St. Keyne was a true Breconshire saint. It was quite new to himself, and he thought to many of them. He then called on Dr. Chapman, who pointed out how glacier action had been the means of forming the small mountain tarn immediately below by depositing a bank of moraine on the lower side. The geological formation of the Brecon mountains is that of the Old Red Sandstone, but the strata at the very top lie horizontally, and the wonder is how so small a portion of rock could be left, where so much must have been removed all round it. The horizontal position of the strata explains the reason why there should be boggy ground on the surface of the summit, although it is so small; and it explains, too, the origin of the small spring of delicious water that flows out on the very high ground between the lofty peaks. All parties who have shared in pic nic parties there on a hot day, have pleasant recollections of this spring.

"Safe on the summit, near that famous well,
Our bottles cooled within its rushy cell,
The social meal is shared, the wine is quaffed,
The speeches spoken, and the laughter laughed."

Giraldus Cambrensis and Leland in describing the Beacons both notice this spring on the summit. The well, however, is very boggy and difficult of approach, and it might very easily be improved. The Woolhope Club, ever ready with a beneficent suggestion, calls upon some of the gallant young men of Brecon to take a spade and pick-axe up to clear away the bog and rushes from its outlet. The stones are

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there to furnish its sides, and a sound foot-way to it, so that the young ladies may readily help themselves to a glass of its pure water without difficulty. An hour or two's work would clear it effectually, and then it would deserve the name the Club now give it of "Ffunnon-gwr," or "The Bachelor's Spring." Why should not this be done on the 8th of the Ides of October, the feast of St. Keyne? See to it, oh young men, that the reproach may pass from you! and you will enjoy all the more the contents of the bottles that may still be cooled in the rushes at hand. The view from the summit, on all sides, is very fine. It is said that on a clear day twelve or thirteen counties may be looked upon, besides the Bristol Channel from Swansea nearly to Chepstow; but this day was not particularly clear, and time was short, so let it pass. The descent, as usual, was easily made, and after a photograph had been taken of the waterfall, with a group of the visitors, the carriages were quickly rejoined. Time did not admit of botanising on the mountain; but the most interesting plant found was the Bog Asphodel, or Lancashire Asphodel, as it is called in old books, *Narthecium ossifragum*, or Llaf-y-bladur, as the Welsh call it. This pretty little plant, with its spike of bright flowers—clear yellow within and green without—is believed in Switzerland to be noxious to sheep, whose bones it is imagined to soften—and hence its "break-bone" name. Linnæus, however, showed this to be purely prejudice, for neither sheep nor swine will eat it, though cows and horses do so without the least injury. It was plentiful in some few places on the slopes of the hill. The scenery again made the ride very enjoyable; for when the range of the Epynt hills was hidden, the lights and shadows of the steep northern ends of the Black Mountain ranges were particularly fine. At Christ College, on entering Brecon, the carriages were stopped that the chapel might be visited where the learned Bishop Bull lies buried between two of his predecessors in the See of St. David's (Bishops Mainwaring and Lucy), "within the communion rails, near the place where the high altar formerly stood." Mr. Registrar Jones, in his *History of Brecknockshire*, speaks of this orthodox divine as "the great and immortal George Bull—

"Cujus magnum nomen nulla capit tabula nulla delebit ætas"—

and that this verdict is borne out in modern days may be proved by this fact amongst others, that the late Rev. Dr. Hook, Dean of Chichester, in his Sermons on the "Church and her Ordinances" (1876), when referring to a question relating to the Service of the Holy Communion, says (page 180), I shall conclude "in the words of perhaps the most learned divine the Church of England has ever produced,—that godly man, Bishop Bull." The modern improvements of encaustic tiles filled up the space pointed out, and no slab indicated the place of burial; but on the south wall, a large white marble slab bore a long Latin inscription in his honour. The most notable feature in the College Chapel are the rows of lancet windows set close together on each side, as is found at Lugwardine Church, and but rarely elsewhere. It is probably a reconstruction on the site of the original church. The Castle Hotel was reached in but little more than half-an-hour after time, and the party left behind were found very wisely to have dined at leisure. It is time to tell of their doings, and Mr. Price's

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information given during the day, and this may best be done in a connected narrative.

The town of Brecon is purely Norman. No Roman coins or other remains have ever been found there. It was founded by Bernard Newmarch, after he had conquered the unfortunate Bleddin ap Maenarch. He razed to the ground the British city of Caer, then called Caervong, or Caervon, which was situated three miles higher up on the banks of the river Usk, and removed all the materials to Brecon. Here he built the Castle, c. 1092-94. Caer, in two or three charters of Bernard Newmarch and Roger, Earl of Hereford, to the monks of Brecon, is called "vasta civitas," and it therefore occupied a considerable space. It was so strongly fortified that Newmarch, when he invaded the district (1091), avoided it, and made a feint by filing off northwards along the ridge parallel to the river Yscir, as if making for the Epynt range of hills. The British ruler, Bleddin, with his brother-in-law, Rhys-ap-Twydwr, led their men along the lane on the other side of the river called Heol-y-Cwmri, from which they watched the Normans. Tradition fixes the site of the battle which decided the fate of Breconshire, at the hamlet of Battle, three miles from Brecon, now a distinct parish. The Normans were crossing the river Yscir by a wood, called from this event, Cwmgwern-y-gâd (now corrupted to Cwmgwingad) meaning the wood of the vale of the battle. Here the British attacked them with great fierceness, but the discipline of the Normans prevailed. The British were driven back with much slaughter, and in their retreat, tradition states that Rhys lost his head on the common above, near a well that has since been called Ffunnon Pen Rhys. Such is the account given by Mr. Registrar Jones in his history of the county; and he also states that the existence of a Maen-hir (a long upright stone) just below the church, may serve also to support the tradition. Newmarch set to work to build his castle at Brecon, 1094, and surrounded the town by a wall. He also, in imitation of his master, William the Conqueror, built a church and monastery as a thank-offering for his victory. He attached it as a cell to Battle Abbey, in Surrey, and endowed it with the hamlet of Battle, on which the victory was gained. The Castle Hotel occupies part of the site of the old fortress, and in the garden, one of the towers and some of the old walls remain. The remains of the Ely tower are now in private grounds, opposite the hotel, on a high mound. It takes its name from that able and artful politician, John Morton, Bishop of Ely, who was imprisoned here by King Richard. Henry, Duke of Buckingham, who was Lord High Constable of England, and Governor of all the King's Castles in Wales, claims the Earldom of Hereford from the King, who abruptly refuses, and Buckingham comes to Brecon Castle.

> "Is it even so? repays he my deep service
> With such contempt? Made I him king for this?
> Oh, let me think on Hastings, and be gone
> To Brecknock, while my fearful head is on."
>
> SHAKESPEARE—*Richard III., Act 4, Scene 2.*

Here he conspires with Morton to dethrone King Richard, and unite the rival Houses of York and Lancaster. The castle was demolished in the time of Charles I.

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Mr. Price escorted his visitors to the British encampment on Crug-hill, and showed them the Maendu Well, or Blackstone Well, from which the water was conducted by a leaden pipe to supply the castle. Mr. Joseph Josephs sent a section of the pipe for inspection. It was discovered accidentally by a drainer about thirty years since, and he sold a considerable portion as old metal. The pipe was not cast, but was well made from sheet lead, with an enclosing cap over the line of junction.

The dinner provided at the Castle Hotel was substantial and good, but the active spirits of the Club, who had been to the Beacon, had but little time to eat. Grace was said when some of the party had but just begun, and the President announced that no more papers would be read, and that all who would visit the noble Priory Church must go there at once. The Rev. Rees Price again kindly led the way, and the locality was soon announced by the projection of fine corbels from old walls, apropos of nothing. The Priory Church of St. John the Evangelist was entered from the north side of the nave, and the effect on entering is exceedingly striking and dignified. There is no Parish Church in the west of England to compare with it. The impression it creates is rather that of a small Cathedral than that of an ordinary Church. Its spacious interior, its excellent proportions, its lofty nave, its central tower and transepts, and its elegant chancel, produce, on the whole, an effect that is not often surpassed. The church is built with cross aisles, "ecclesia sanctæ crucis," but the present church is clearly not the one built by Bernard Newmarch, though the circular bowl of the font, which is extremely richly ornamented, may be as early, or even earlier than his time. It is the most ancient object in the church, and seems to bear an inscription around the bowl, which time did not admit of any careful attempt to decipher. The chancel is one of the finest examples of early English work of the 13th century, the lancet windows being profusely ornamented with slender detached shafts, with a vaulted engroined roof, which, though recently constructed, looks like a true reproduction of the original design. A very large sum has been recently expended on the fabric under the late Sir Gilbert Scott, and the restoration effected may be ranked amongst the most successful of the many churches he has taken in hand. It is pure stone work throughout the interior, here and there exposing remnants of old mural decoration. The transepts are of about the same date as the chancel. The north transept is called "The Chapel of the Men of Battle," and the south transept bears the name of "Cappel y cochiaid," or the red haired men's chapel; but in later years certainly the Normans must have found seats elsewhere, for the monks must have been constantly passing through it—to and fro, for the service. In the angle between the north transept and the chancel is the Havard chapel of the 13th and 14th century, and in the corresponding angle on the south side was a similar chapel, now much altered. The nave and aisles are late 14th century work. Space permits not to tell of the curiously perforated panels of the pulpit, the remnants of carved oak screen; but there is one feature for which the church is especially remarkable, and that is for the highly creditable manner in which the monuments and numerous ancient monument stones have been respected and allowed to remain *in situ*. It would be difficult to find

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another church in which so many ancient stones with floriated crosses and inscriptions in bold character are to be found. This remarkable church, in short, presents a grand field for the antiquary. It would take days and weeks to study its details and its many points of architectural interest. The eastern window with five lancets, has been recently filled with stained glass to the officers and men of the 24th Regiment, who fell in the South African campaign, and a large brass plate sets forth the names of those who fell so nobly in their country's cause.

Such are the imperfect notes that a visit of less than an hour enabled the Club to make. The last minute that could be given was spent there, for the carriages were ordered to be at the gate; and thanking very much the Rev. Rees Price and Miss Morgan for all the information they so kindly gave to the members, a rush was made to catch the train. On the road, however, a couple of pictures were called for—one of the good Bishop Bull, and another, on mahogany panels, a portrait of Caractacus, (auction, guaranteed !), The discussion on the authenticity of the likeness of the British chieftain enlivened many a mile as the train sped on, when the cry of a station porter—Aiy ! Aiy ! Aiy !—was heard (it is difficult to express in type the peculiar phonetic expression used). The cry was meant to announce the arrival at the ancient border town of Hay, and gave rise to a discussion on the use and misuse of the letter H. Worcestershire, it seems, is remarkable for variations with regard to it; and a gentleman present quoted the following petition which is old enough and clever enough to be published again:—

THE PETITION OF THE LETTER H TO THE INHABITANTS OF WORCESTERSHIRE.

As since by you I have been driven
From "house," from "home," from "hope," from "heaven,"
And placed by your most learn'd society
In "Exile," "Anguish," and "Anxiety,"
And used without one just pretence
In "Arrogance," and "Insolence,"
I think I need full restitution
And beg you'll mend your elocution.

But Worcestershire was equal to the occasion, and said in answer—

Since we have rescued you, Ingrate,
From "hell," from "horror," and from "hate,"
From "Horse-pond," "Hedge," "Hill," and "Halter,"
And consecrated you in "Altar,"
We think you need no restitution
And shall not mend our elocution.

So has passed off into history, with many pleasing recollections, another ladies' day of the Woolhope Club. The day was not long enough, and indeed, there is so much of interest—historical, archæological, antiquarian, and scientific—in and around Brecon, that it would require many days to investigate at leisure. The very walls in Brecon itself so teem with ferns and wild flowers, which seemed all blossoming at once, that it would occupy a full half day's pleasant work to any botanist, though it would require a long ladder to get at some of them.

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Woolhope Naturalists' Field Club.

AUGUST 22ND, 1882.

IVINGTON CAMP.

"Go call a coach, and let a coach be called."

THE situation of Ivington Camp is so very secluded and so difficult of approach, that, in all the years of its existence, the Woolhope Club has never found it convenient to get there. It was resolved this year to visit it, and it was proposed to make the advance from Ford Bridge Station. The railway authorities, however, are just now so happy and contented with the crowds of travellers that fill their trains that they could neither set us down, nor pick us up, at any convenient time. The old "four-in-hand" was resorted to, and the Club resolved to inspect the churches on the way, and here are the critical comments of the passers by :—

HOLMER CHURCH was the first to be visited. It is dedicated to St. Bartholomew, and has the great peculiarity of a detached tower. There are six other churches in the county similarly circumstanced, those of Ledbury, Bosbury, Pembridge, Yarpole, Garway, and the neighbouring one of Marden was so originally. The lower portion of the square tower is stone work, upon which an upper story of timber and plaster was erected in the 16th century, to make room for the peal of five bells. The earliest bell bears the date 1609, with the inscription, "God bless our noball king Jamese," and the tenor bell also bears this inscription :

"My roaring sound doth warning give
That men cannot here alwayes live."

The church itself has been well restored within the last few years by Mr. Seddon. It is early English in character, and above the average size. The roof is very good, with projecting hammer beams of excellent construction. The three small detached lancet windows in the chancel were filled with stained glass in 1865, to the memory of Mr. Charles Bulmer. The earliest entry in the existing register bears the date of 1712. There are the remains of an old stone cross in the churchyard, and the pretty churchyard should not be left without the remark that it was the first in the county to be decorated in the pleasant way now so common, and there were those present who could remember nearly 50 years back how the honeysuckles and roses flourished under the fostering care of that kind-hearted but eccentric lady the late Mrs. Pearce.

PIPE AND LYDE CHURCH was next visited. This church, with the exception of the chancel, was entirely rebuilt, at a cost of nearly £2,000, during the years 1873-75. It was chiefly done under the personal superintendence of the late Vicar, the Rev. F. T. Havergal, and it is therefore scarcely necessary to state that it was

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thoroughly well done. Its chief features are, first the fine old oak roof; it is 15th century work, and the whole of it was carefully taken down, repaired, and restored. The next feature is a richly carved rood beam, stretching across the church, with the original stone staircase remaining at its north end, which formerly led up to the rood loft. A third good feature is that the fine porch, the pulpit, the reredos, the lectern, and the font are all modern gifts, and several of them with excellent taste serve as memorials to the departed. The costly porch was erected by Mrs. Built, to the memory of her husband; and the pierced reredos is a gift of the Freemasons to the memory of the late Mr. George, of Hereford. The church is dedicated to St. Peter, and has a peal of four bells, two of which are mediæval, but are at this time unapproachable, in consequence of the tower being unfinished. The earliest register in the parish bears the date of 1558.

MORETON CHURCH, dedicated to St. Andrew, lies some hundred yards or so from the main road. Most of the members walked there, and were very kindly received by the Incumbent, the Rev. C. H. Taylor. The church is of white stone, Gothic, and was entirely rebuilt by the late Mr. Evans, of Moreton Court. It is small, very highly decorated, and kept with scrupulous care. There are two bells.

A melancholy spectacle was next forced on the observation of the travellers, in the ruinous, uncared for, uninhabitable state of Perrott Almshouses, by the high road in Wellington parish. These six almshouses were erected in 1682 by Sir Herbert Perrott for aged men, with an endowment of £20, a new pair of shoes and a coat each. The condition of the houses was evident, but what has become of the handsome endowment attached to them could not be ascertained in the time at the disposal of the passers by. There should be no doubt on such a subject, for the funds of all endowed charities require the public eye upon them. See to it, good people!

The carriages were left at the Bridge Inn, and the members walked on the raised pathway by the brook lane to WELLINGTON CHURCH, indeed a noble building, and one of the most interesting fabrics in the locality. Its size and massive tower give it a striking character. It is dedicated to St. Margaret. The church is entered on the south side through a timber porch, and the timber work of the porch roof, in fair preservation, is perhaps the most interesting example existing in the county. On entering the Norman door the church is large and spacious, and the rich timbers of the roof of the nave, north aisle and transept, at once attract the eye. There are no boards upon them, the tiles are visible throughout (and also the sky in some places). The details of the timbers are very rich, especially the wall plates, braces, and bosses, which are of unusual size. The chancel arch is plain Norman work, its roof is simply lath and plaster, and its south wall contains a door and four windows with straight sided heads of unusual character. In this wall, an ancient recess—possibly an ambry for keeping the sacred vessels—has a covering of ancient oak of a peculiarly rich design, possibly a portion of the screen long since destroyed. The piscina projects like a bracket from the eastern wall, and on the northern side is an early monumental recess and arch of extreme interest. The east window is of late construction. It is large, with three lights, containing fragments of old glass and ornamental quarries. The

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whole church is filled with pews, and the three decker pulpit erected against the southern wall of the nave is said to have been brought from Ross some few years since. The whole church urgently requires repair and restoration, and as an example of such unusual value, it should be conducted with the utmost care; and let us hope that modern encaustic tiles will not be allowed to supplant the present stone pavement. The fine massive tower is enriched with small columns and carved capitals, of very early type. It contains a peal of five bells. Above the bell-loft window the tower has been carried up with plain masonry several feet higher at a late period. On the eastern side of the tower the weather border remaining proves that the pitch of the original roof of the church was steeper than the present one. The outer side of the chancel wall has been covered with gravel and plaster, and a portion of it having fallen away, the deficiency has been supplied by two grave stones with modern inscriptions on them, placed sideways one above the other, a rather unusual instance of village practical economy!—On the south side of the church is an ancient stone cross, an octagon with a lofty shaft, and a fine lime tree stands on the wall, measuring 18 ft. 4 in. in circumference, with a younger one, very vigorous, measuring 7 ft. 3 in., which is stated for future comparison.—The yew on the eastern side measures 13 ft. 6 in., but upon it were several specimens of the fungus *Polyporus sulfureus* very beautiful in themselves, though these were past their prime, but sadly indicative of tree decay.

The carriages were regained, and the company taken over Dinmore Hill right pleasantly. The next stoppage was made at HOPE-UNDER-DINMORE CHURCH, when the present Incumbent, the Rev. W. Townsend, kindly received the Club. The church is dedicated to St. Mary. It is very striking on entering from its height and good proportion. The restoration began in 1836, and was admirably completed in 1879, by Mr. F. R. Kempson, at the cost of £1170, with the stone of the locality. In the chancel there is a fine monument designed by Roubilliac, said to be Sir Thomas Coningsby, who founded the Hospital at Hereford, 1614. It is very remarkable from the central space left for the inscription being perfectly blank. The female figure is believed to be sculptured by Roubilliac himself. A white slab with two incised effigies, life-size, is erected against the wall on the south side of the sacrarium. The base of the tower is open to the church as a baptistry, lighted by a fine lancet window of coloured glass. The font is very old and rich. The north transept was erected to the memory of Richard Arkwright, Esq., who died 1858. There are three bells, which were recast in 1829. The parish register only dates back to 1701. In the high ground on the south side of the church is a yew tree measuring 12 ft. 10 in.; and standing against the north corner of the church wall is a tombstone to Henry Burford, bearing the date of 1670.

The carriages were again taken for Ivington, with some considerable doubt as to how they could get to Gattertop, but go the leaders would, and the natives smiled as the laden vehicles turned up the lane at Marlbrook. The road began well, but soon degenerated into stones and ruts of increasing size and depth until at last these disappeared, and after a wrong turn the carriages were sent

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empty along some grass fields, across the top of a splendid hop-yard (sadly blighted were the hops !), and at length reached Gattertop through the home orchard, the coachman having considerable difficulty in keeping his seat, now from the jolt into a deep rut, and again from the encounter of an apple tree. The members of the Club meanwhile attacked the camp from the hill, and winding through wheat fields at length passed the ditches and ramparts into the outer camp, where Mr. Smith, the resident, was ready, very kindly, to direct them. Here was some excellent and very refreshing cider, most kindly sent by Mr. Vevers, of Ivington Park. The camp is of considerable size. The inner camp now occupied by a fine crop of wheat, measures in clear space 7½ acres, whilst the outer camp is divided into two fields—one in pasture, with a substantial cottage and homestead, and the other occupied by mangolds, turnips, and a crop that at first looked composed of matricaria chamomila, or chamomile, but which on further examination proved to be peas. These fields measure in clear space 13 acres, so that independently of the extensive ramparts and ditches, the camp covers more than 20 acres of ground. There is an excellent spring of water near the cottage, so that the camp could be held for a considerable time. The earthworks are very strong on the south and west sides, and the chief entrance at the south-east corner is particularly guarded. On the north and west sides the ramparts are not so bold, for the hill there is much more steep. In a lime cornstone quarry, at the north corner, over 20 graves have been discovered, and with crumbling bones in some of them. In an open space in this corner Dr. BULL read the following paper:—

IVINGTON CAMP.

Tradition and history agree in identifying this hill as the scene of some incident in bygone times of the highest interest. Its secluded situation, and its strong natural position, crowned with the remains of very considerable earthworks, fully bear out the facts. It is proposed now briefly to recall to your recollection on the spot the chief events that are thus attached to the locality.

In the first place tradition states that this hill was once "the sacred scene of Bardic worship and Druidic lore. Under hallowed and umbrageous oaks, curtained with ivy and feeding the sage mistletoe, the venerable Druid performed mysterious rites, or dispensed to the listening throng traditionary lore, explaining the changeful universe, or awakening into living ecstasy the melodious lyre hymning immortal strains." These are the words, with many more in a similar strain, of Mr. Jonathan Williams, an authority so high that he is quoted by all the local directories and guide-books. "Here the war-detesting Druids remained," he adds, "until the invasion of the Romans drove them to the more peaceful and less frequented recesses of Mona and Anglesea, where they could perform their sacred rites in secrecy and silence." In support of this tradition it is stated that "a venerable instrument, a Druidical hatchet curiously engraved, which was a sacred instrument used in cutting the mistletoe from the oak," was found here in 1764. Whatever influence this base representative of the "golden sickle" may be supposed to have had with the unlearned was however effectually destroyed by the

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fact of a second hatchet being turned up by the plough shortly afterwards. Without entering for one moment into the mystic rites of Druidism, there can be no doubt but that the mistletoe was held by the Druids in the highest esteem. It was the Pren awyr, the etherial tree, the Pren puraur, the tree of pure gold, Pren ulchever, the tree of high summit, etc., which the Arch-Druid gathered with a golden hook. The mistletoe, trefoil, oak, and wheat, form the bardic emblems of the four seasons. The ancient Celtic bards Taliesin, Aneurin, Llywarch, Hên, Merrdin, &c., were themselves professed Druids, and in one of the old poems, "Kadier Taliesin" (the Chair of Taliesin), the mistletoe is specially mentioned as one of the ingredients of the celebrated "mystical cauldron," prepared with the most elaborate and careful ceremony at the feast of Ceridwen. From this "cauldron" Genius, Inspiration, Science, and Immortality were supposed to be derived. The mistletoe, "the tree of pure gold, contributed the fructifying quality," says the poem, "when that brewer gives it a boiling who presided over the cauldron of the five plants." This power of promoting the increase of the species, or preventing sterility, thus alluded to by the bards, has ever been attached to the mistletoe, and may be traced to this day in the customs of the people. It was, however, the mistletoe growing on their sacred tree—the oak—which excited so strongly the veneration of the Druids, and, knowing this, modern bardic authorities are too apt to attach mistletoe oak to every druidical place of worship, as if it could be made to grow on oaks at pleasure. This is not the case, for no one has yet been able to make it grow on the oak. Herefordshire is the home of the mistletoe, and the oak has been termed "the weed of the county;" and yet there are but eight known examples of mistletoe oak in Herefordshire; and it may safely be added that there is not a single known example in all Wales, with Mona and Anglesea to boot. It is evident, at any rate, that modern bardic writers know little about it. If, therefore, you should wish to believe the tradition that bardic worship was practised on this hill, and mistletoe oaks did exist here, as may possibly have been the case, you are requested to do so on the authority of the bards rather than on that of the Woolhope Club.

The formation of the hill into a military camp is the next point to be introduced to your notice, and here history and the existence of the fosses and ramparts come to the assistance of tradition. This camp is believed to be originally a British camp from the mode of construction of its inner portion, and it is supposed to be one of those formed by Caractacus ap Bran during his long struggle with the Roman general Ostorius Scapula. The excellent paper read before the Club on Coxwall Knoll a few months since by Mr. Burrough on the site of the last battle of Caractacus, introduced this subject to the consideration of the members. The course of Caractacus was then endeavoured to be traced by the existence of British camps, with camps of Roman construction in their immediate neighbourhood. Whilst the Silurian chieftain occupied this camp, Ostorius is believed to have occupied the hill you see on the north looking across the valley about three miles off called Caerneveh, Kersneh, or Carne Hill, now vulgarly called Corner Cop. The proof that this was so consists not only in the

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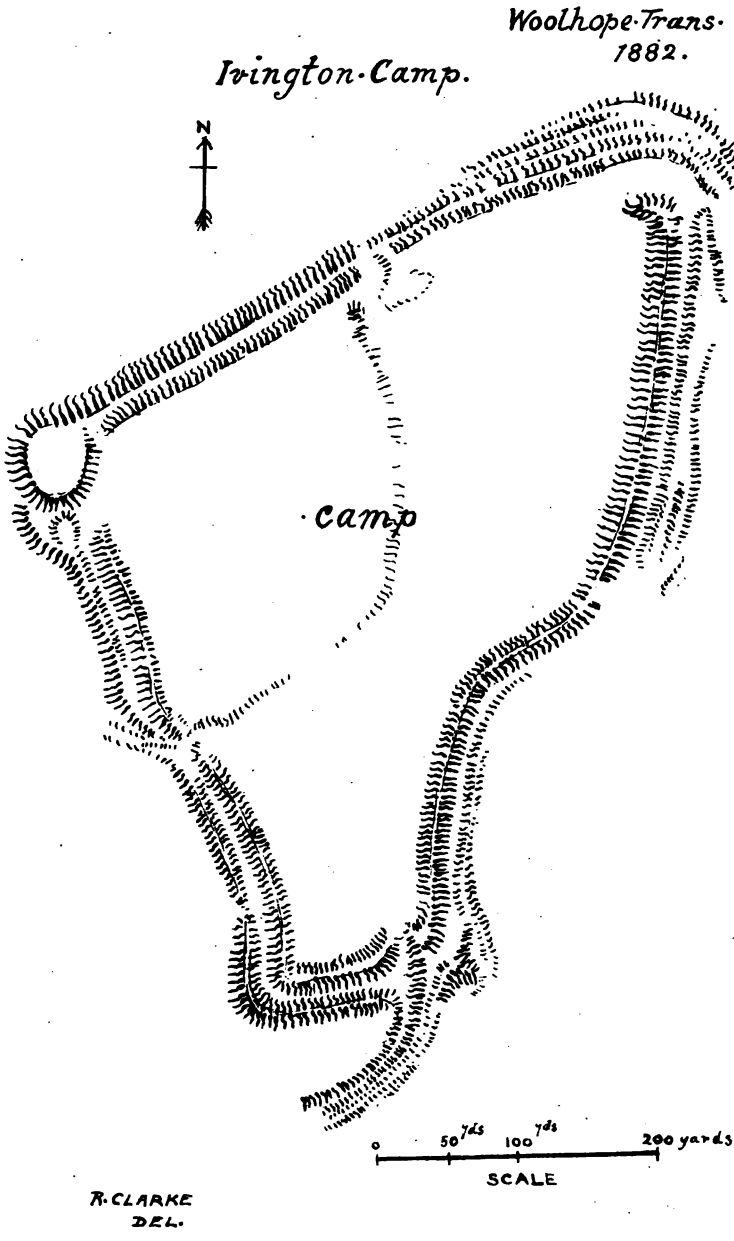

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fact of the remains of entrenchments there, but also from the name "Caer Ostruy," or Ostorius Camp, or fort, existing to the present time in its corrupted form of "Cholstrey," by which the hamlet is called lying beyond the entrenchments. It is a remarkable fact that the Roman general always constructed his camps at a considerable distance from the heights occupied by the British chieftain, and usually on a moderate elevation. Ostorius seemed always to respect the vigour of his opponent, and took care to keep plenty of open ground before him. The wide marshy valley caused by Stretford brook and the river Arrow, both very liable to overflow their banks, would prevent the growth of timber, and thus enable him to watch more closely the movements of the enemy and save him from surprise. There is no proof as to how long the British held this camp, but it is probable that they may have done so at intervals for many years; neither is there any reason to conclude, either from tradition or from the existence of burial tumuli in the immediate neighbourhood, that any important battle was fought here. There can be no doubt that the Romans occupied this camp for a considerable time after the defeat of Caractacus. They are believed to have constructed the large outer encampment and probably strengthened it everywhere. For many years the Silurians could only be governed by martial law, and placed as this camp is at a convenient distance from the Roman road up the valley of the Lug, and the Roman station of Black-caer-dun situated upon it, on one side; and the Roman road from Magna Castra (Kenchester) passing Stretford bridge to Bravinium (Brandon) on the other, must have made it a very convenient station for them in after years. The Roman remains found here have, however, been very trifling, and it was probably, therefore, nothing more than a military station at any time.

A few centuries later this camp became the scene of another historical incident of high interest. At the latter end of the 14th century, or at the first year of the 15th century—for the date usually assigned is 1401—Owen Glendower took possession of it with his forces. This renowned Welsh chieftain, being aggrieved by the encroachments on his territories by Lord Ruthin, and Edmund Mortimer being unable to obtain any redress from Parliament, resolved to procure it by his own sword. He fought and slew Lord Ruthin, defeated Mortimer at Melienwydd, near Knighton, plundered and burnt the Abbey Cwm-hir, whose monks had betrayed him, took and destroyed the town and castle of Radnor, and advanced into Herefordshire. Here he was met by Lord Mortimer (who only escaped by the swiftness of his horse from the battle of Melienwydd) with a second army of 6,000 men, it is said, collected from Leominster, Weobley, Wigmore, and the adjacent districts. Glendower's forces amounted to little over 2,000 men, and, having left the camp of Wapley, he was laying waste the country on all sides, and had but just time to get his men into this camp to prevent his being overpowered by numbers. He had no sooner done so than sudden heavy rains swelled the river Arrow and Stretford brook to such an extent that it was attributed by the ignorant soldiers to magic.

"The great magician, damned Glendower."
SHAKESPEARE, *Henry IV.*, *1-3*.

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and whether from the superstition affecting his men, or from the knowledge that Glendower had no supply of provisions with him, Mortimer did not attempt to cross the valley, but used the utmost precautions to prevent supplies from reaching the enemy. The plan was completely successful, and forced upon Glendower the necessity of taking the offensive. He decided upon doing so, and having made a long spirited address to his forces, which inflamed their ardour to the utmost, he sent a large body of men, with many archers, the evening before to cross the river higher up, and attack the rear of the enemy, and when he observed this manœuvre succeeded in driving Mortimer from the banks of the river, Glendower immediately crossed it, he himself being the first to reach the opposite bank. Mortimer quickly returned, and a single combat ensued between the two brave leaders. The victory was long disputed, but it ended at last in favour of Glendower, who disarmed and wounded Mortimer, and took him prisoner. Shakespeare thus graphically discribes the fight :—

> When on the gentle *Arrow's* sedgy bank,
> In single opposition, hand to hand,
> He did confound the best part of an hour
> In changing hardiment with great Glendower,
> Three times they breathed, and three times did they drink
> Upon agreement, of swift *Arrow's* flood,
> Who then, affrighted with their bloody looks,
> Ran fearfully among the trembling reeds,
> Blood-stained with these valiant combatants.
>
> *Henry IV., Part I., Scene 3.*

Shakespeare names the Severn by mischance, instead of the Arrow, to which river his description, and all collateral circumstances undoubtedly point. The defeat of Mortimer caused the overthrow of his army. It gave way on all sides, and the slaughter was very great. The arrival of the news in London is thus given by Shakespeare in the same play—

> When all athwart there came
> A post from Wales, laden with heavy news;
> Whose worst was that the noble Mortimer,
> Leading the men of Herefordshire to fight
> Against the irregular and wild Glendower,
> Was by the rude hands of that Welshman taken,
> A thousand of his people butchered.
>
> *Henry IV., Part I., Scene 1.*

The loss was not quite so great in all probability, but the victory was decisive, and Glendower spared no energy to render it complete. He sent men at once to occupy the camps of Risbury, Croft, Ambery, and Wapley, and marched himself to Leominster, which yielded without a struggle. He despoiled the Priory and appropriated the revenue to his own use, and rewarded his followers by distributing different districts of the county to them. This camp and the surrounding district between the two rivers he gave to Ievan, or Evan of Wales, comprising Ivington and Brierly. To Rhys ap Griffith were alloted Risbury, Humber, and Stoke; Eaton, Stretford, and Hennor were awarded to Ap Llhwyd, or Hackluit, as the family name was afterwards called, according to Leland, but nevertheless a Hackluyt was sheriff of Herefordshire in the first year of Edward II., A.D. 1309, long before Owen Glendower was born. Philip ap Morgan and other followers were awarded other lands. That these followers retained possession of the estates thus given them is proved by the fact of their

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families remaining in the county. Glendower also shortly afterwards increased his own position and influence by marrying his three daughters to leading men of the county, viz., to Scudamore of Kentchurch, to Monnington of Monnington, and to Croft, of Croft Castle. This camp and all others thus taken possession of were no doubt occupied for some considerable time, until the country had become tranquil and the inhabitants reconciled to the change of ownership. Several coins have been found in Ivington camp bearing the dates of 1339 and 1340, which are attributed to this occupation. Lord Mortimer, Earl of March, was detained a prisoner, until at length the Earl of Northumberland paid the heavy ransom demanded by Glendower, effected their reconciliation, and the three conspired together to overthrow King Henry, as is well known. On the failure of this conspiracy, and after the battle of Shrewsbury, nothing further is heard of Glendower. Some say he lived in retirement at Kentchurch under the pseudonym of "Jack of Kent," and built the bridge over the Monnow in a single night by the aid of the devil. His burial place is equally uncertain. Some think he was buried at Grosmont. A large rude stone effigy which seems to have been left half-finished was found some years since in Grosmont churchyard, and is supposed to be "Jack of Kent." It is now lying temporarily in the nave of Grosmont Church. Others say his tombstone with the remains of a skeleton beneath it was found buried at Monnington half within and half without the walls of the church.

One other brief historical picture must yet be placed before you from its great local interest, though its scene is laid in the Roman camp on the opposite hill and not in this one. In the year 1553–4 occurred the Protestant insurrection in favour of Lady Jane Grey, which is commonly called Wyatt's conspiracy. Sir James Croft, of Croft Castle, came down into Herefordshire, and with Warnicomb of Ivington and Hacluit of Eaton, mustered their servants and dependants, and, encouraged by the energy of John Harley, Bishop of Hereford, who also joined the insurgents in person, endeavoured to induce the inhabitants of Leominster to join their cause. The people of Leominster, however, had not forgotten the losses suffered by the town from the dissolution of the Priory, the abolition of the local courts and sessions, and other Protestant changes, and were unanimous in favour of Queen Mary. Sir James Croft and his companions in arms were obliged to leave the town, and, being unable to keep the field, and in order to prevent surprise, took possession of the old entrenchments near Caerneveh or Carne-hill, on the banks of the Pinsilley or Pinsley brook. Here they hoped to defend themselves till reinforcements should arrive from Wales and elsewhere. The council of Queen Mary however had sent orders to the Lord President of the Marches at Ludlow to counteract this movement, and Sir Philip Hoby was sent down to take command of the local forces. He was joined by Sir Richard Walwyn of Much Marcle at the head of the men from the Greytree Hundred, Sir Thomas Thockmorton of Marden, leading the Broxash men, and Street of Street Court with the men from his own district. They were encouraged and aided in person by the presence of Robert Purfew of Wharton, Bishop of St. Asaph (consecrated 1537). Sir Philip Hoby advanced without loss

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of time and invested the camp on all sides. No reinforcements came to join the insurgents, and want of food soon compelled Sir James Croft and his partisans to cut their way through the besieging forces, and they only succeeded in doing so by a considerable loss of men, for the greater part were either killed or made prisoners. This fight, sometimes called the battle of Leominster, silenced for a long time the protestant interest in this part of the country, and was thought of so much consequence by Queen Mary's Council, that honours and preferments were immediately awarded to the victors. Bishop Harley, who had only been consecrated a few months before, was deposed, on the plea of his being a married priest, to make way for Bishop Purfew, who was translated from St. Asaph to the See of Hereford (1554), and he held it until his death in 1557. The honour of knighthood was conferred on Street; and an extensive charter was granted to the citizens of Leominster.

It was this untoward conspiracy that caused Lady Jane Grey and her young husband to be hurried to the scaffold. Sir James Croft escaped, but afterwards surrendered himself to the Council at Ludlow, who sent him a prisoner to the Tower of London. He was convicted of treason, but obtained immediate pardon through the intercession of the Earl of Arundel. Bishop Harley also escaped, and died in obscurity about the year 1557.

There is no record of any military occupation of Ivington Camp for the last three hundred years. Its excluded position rendered it unavailable during the civil war, and there has happily been no other occasion on which it would have been useful. It has thus been surrendered to the peaceful occupation of agriculture. Woods cover its bold entrenchments; wheat is cultivated in its inner camp; whilst peas, turnips, and mangolds are grown in the outer one. The view from the camp on every side, when the trees will allow you to see them, are as extensive and beautiful as they are rich and luxuriant. It is seldom visited, except by the foxhunters, sportsmen, or an occasional archæologist of unusual zeal. A poet, however, has been here, and his description thus given is singularly appropriate—

"Here Lugg and Arrow urge their wandering way,
Flame on the view beneath the fervid ray.
Rich pastures here, and swelling lawns invite,
And all Arcadia charms the raptur'd sight.
There bounteous Ceres waves her golden stores,
Here all her blooming wealth Pomona pours.
Here the aspiring hop's luxuriant bine
Climbs the tall pole and wavers in the wind.
What radient tints adorn the enamell'd ground,
What rich Sabeian odours float around!"—*Maurice.*

These fragmentary sketches of local history will remind you all of the very valuable addition that has recently been made to the literature of the county. The publication of a third volume to Duncumb's History of the County, by Mr. W. H. Cooke, M.A., Q.C., &c., &c., is a subject of the highest interest and importance to all Herefordshire men. The Woolhope Club welcomes its publication most cordially, and heartily congratulates its author on its appearance. This volume completes the Greytree Hundred, on the southern side of the county. It shows throughout the great pains that have been taken to render it exact; and it is, moreover, so well written, and so full of local interest that it should take its place in every library of importance in the county. Though it does not refer to

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this portion of the county, yet in the history of the Walwyns of Much Marcle, there will be found, at page 15, an excellent summary of the Wyatt conspiracy as far as it relates to this county, and to which this paper has been considerably indebted.

The paper was listened to with much interest, but there was no time to discuss it, for the carriages had to be taken as quickly as might be for Birley, and again passing through a sea of beautiful corn, the Club soon arrived there.

Birley Church is very striking and picturesque in its general aspect. A large massive tower, early English, covered with ivy, and a projecting south transept with timber-headed work, are its peculiar features. The ivy springs from a single trunk, which measured round its outer surface, 4ft. 6in. The church is entered by an early Norman doorway, and the newness of the interior contrasts strangely with its outer aspect. The floor throughout is of unexceptional encaustic tiles, to the rejection of the old pavement and every inscription that might chance to be on the stones. What remains of the old work about the chancel arch is very interesting, but the upper portion has been modernised past speaking about. A small three-light lancet window in the east end has been surmounted by a large circular wheel window, modern enough; let nothing more be said of it. The fine ash tree at the churchyard wall, on the west side, measured 13ft. 7in. Mr. Joseph Parry, who kindly supplied a steed to the Club's chronicler, very hospitably received such members at the Court as failed to fall in with the cider at the camp —and then "Forward" again was the cry, and the way was taken over Bush Bank to Pyon.

Canon Pyon Church is approached by a small lych gate into a fine churchyard, where it is said many gipsies come to be buried, and indeed there are many brought into the parish at times of hop-picking, &c. The entrance to the church is on the south side, under the lofty square tower. The interior is spacious, with open aisles on each side the nave. The arcade is very striking, the pillory arches being all of good early English design. Those on the south side have fallen out of the perpendicular, and are only kept from further displacement by internal flying buttresses. These are also beginning to give way, in two or three instances, and require immediate attention. The chancel is separated from the nave by a pierced oak screen, chiefly of old work. There are also some remarkable oak stalls with movable "miserere" seats. The extreme plainness of the modern roof of the chancel, little better than simple boards with small plain rafters, and the beautifully neat whitewashed walls were very striking with what had been previously seen. It is painful to think it was done so recently as 1867. There is a very interesting slab which formerly contained the brasses of two figures—now filled with cement—which is placed on the floor under the lectern, sadly exposed to further mischance. The font is curious. It consists of fragmentary pieces of stones of various periods. There are five bells in the tower, the largest bears the date 1728, and has on it this inscription:—

"I to the church the living call,
And to the grave do summons all."

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and on a smaller one is the inscription—"Peace and Prosperity to the Church of England." The earliest existing Parish Register only goes back to 1609, and this has nearly perished from damp in the chest in which it has been kept.

So ended the day's Church inspection. The members returned through a drizzling rain to Hereford, and dined well at the Mitre Hotel, under the presidency of the Rev. Augustin Ley (a Vice-President of the Club), in the unavoidable absence of the President, Mr. Blashill. Very excellent papers were read after dinner—one on "Meteorology," by Mr. Henry Southall; and another on the insect "Orgyia antiqua," by Dr. Chapman; and thus the Club recovered its more usual tenor of natural science.

The following gentlemen took part in the day's proceedings—The Revds. Augustin Ley, and G. H. Metcalfe, and Dr. Chapman (Vice-Presidents), Dr. Bull, Revds. C. Burrough, W. D. V. Duncombe, J. E. Grasett, F. T. Havergal, E. J. Holloway, W. A. Hatton, A. G. Jones (senior and junior), H. B. D. Marshall, J. T. Nosworthy, H. W. Phillott, F. S. Stooke-Vaughan, J. Tedman, and H. W. Tweed; Col. Hart, Dr. Wilson, and Messrs. J. Brown, E. Brühl, F. C. Cleasby, A. C. de Boinville, R. Dixon, J. Docking, W. Ewart, J. T. Owen Fowler, J. J. Merriman, J. M. Parry, G. H. Phillott, J. Riley, H. Southall, O. Shellard, E. Watkins, and T. Lane (Secretary).

ON SOME RECENT METEOROLOGICAL EXPERIENCES.

By Mr. Henry Southall, F.R. Met. Soc.

The state of the weather has so large an influence on our health, and comfort, and often so much interferes with our arrangements and pleasures—to say nothing of its more important effects upon the productions of the soil, the prosperity of the country, and the safety of travellers by land and by sea—that however independent we may feel personally of its fluctuations and changes, it is a subject that naturally forces itself upon our attention.

The object of the present paper is not to propound any fresh theory in regard to the laws which regulate our storms or calms, or indeed to attempt to solve any of the puzzling problems which they may suggest; but rather to point out what appear from past records to be the limits of variation to which our English summers are subject.

The poet Thomson, in his *Ode to the Seasons*, thus speaks of summer—

> "Then comes thy glory in the Summer months
> With light and heat refulgent. Then thy sun
> Shoots full perfection through the swelling year:
> And oft thy voice in dreadful thunder speaks,
> And oft at dawn, deep noon, or falling eve,
> By brooks and groves in hollow-whispering gales."

But instead of the appropriateness of this and other descriptions being discussed, the question is constantly asked, and but seldom answered—"How long is

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this weather going to last?" "Is the English climate completely changed?" "Are we never to have summer again?"

A few remarks on this topic may not be inappropriate in the present unsummerlike period, although we may hope we have reached the close of it. I do not wish to recall unpleasant memories of numerous "good wettings," spoiled pic-nics, or postponed parties, or to dwell on the disagreeables which are general concomitants of such a season; but rather to state a few facts by which a comparison may be made with other years, and if there is any conclusion of value to be drawn from such a comparison, to leave it to those wiser than myself to do so. There can be no doubt of the value of meteorological observations, for however little we may yet know of some of the great secrets of the science, and however slight may be our power to forecast with any certainty the coming weather, it cannot be unimportant to store up and accumulate for future use any observations made with sufficient precision and accuracy to be reliable, and thus help to pave the way for future discoveries.

As regards temperature, the year may be divided into three portions of four months each:—(1) A warm period, from May 21 to September 21 (summer). (2) A cold period, from November 21 to March 21 (winter) (3) Two intermediate ones, from March 22 to May 20, and from September 22 to November 20 (spring and autumn).

I only propose to treat now of the first of these which embraces the general limits of our English summer. For notwithstanding that occasionally hot weather sets in earlier than the 20th May, and sometimes (as in 1865) continues till as late as the 7th October (the average temperature of the two dates, May 21 and September 21, being nearly the same), yet real summer weather generally does not begin earlier than the former or continue longer than the latter date.

In estimating the character of the summer season, the principal points to be ascertained are the maximum temperature by day, the minimum temperature by night, quantity or depth of rain, the number of rainy days, amount of sunshine, intervals of fine weather of not less than three days, the prevalence or otherwise of thunderstorms, hailstorms, or tornadoes. The present year may be thus described—A warm period, succeeding a cold one of nearly three months duration, began on the 3rd November, 1881, and continued almost uninterruptedly till the 21st May, 1882. From the 22nd, a wet cool season has prevailed unto the present time, a period of nine weeks, during which we have had a rainfall of $8\frac{3}{4}$ inches, just double the average amount, and in 50 days out of the 63, rain has fallen more or less. Thunderstorms have been very frequent, especially at the commencement of the period, and many lives have been lost in various parts of the country. The wind has been nearly constant from S. to W., and although the temperature has not been so low as in 1879, it has been nearly always below the average, and there have been no days as yet on which a maximum temperature of 80 degrees has been recorded, and very few above 75 degrees. Another feature has been that during the whole period of nine weeks, there has only been one interval of four days without rain. The haymaking, as we all know, has been greatly delayed and I fear much will be spoiled in consequence. The south and

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east of England, and some of the northern districts have fared much better than the western and central parts of England.

This is the sixth summer in succession which has been wet or showery, and I find no record of a similar instance. The seven years 1875-81 are proved by Mr. Symons' *Annual Rainfall*, just published, to be the wettest series of seven years since 1750, and I think it will be found that the principal increase has arisen in the summer months. It is not long, however, since it was supposed that the fall of rain in England was diminishing, and the decennial periods 1850-9 and 1860-9 both showed deficient rainfall. From 1864-71 inclusive, the month of June was exceptionally dry, the only two years having nearly the average amount being 1866 and 1871.

July also was drier than the mean from 1859 to 1876, excepting the years 1861, 1867, 1871, 1872, 1875. It may, therefore, be the case that we are now restoring the balance, and we may have normal, if not dry, seasons approaching.

No doubt the proximate cause of the wetness of the present season has been the continued succession of Atlantic depressions which have passed northwards along our Western coasts. As a consequence the barometer has been almost always highest in the S. of France and lowest to the N.W. of our islands, the result having been that while fine hot weather has prevailed over Spain and the southern half of France, it has been wet and unsettled in the N. of France, and especially so over Ireland and the Midland and Western counties of England. In Hungary the wheat harvest is said to have been the best for 20 years, and reaping to have been nearly finished there by the middle of July.

I think there can be no question but that the effect of the unusually large masses of ice, known to have travelled far south in the West Atlantic, must have been to produce great atmospheric disturbances in those regions; and as we know that by natural processes these commotions are generally communicated in a north-easterly direction, we may fairly assume that the present unsettled weather is at any rate partly attributable to this cause. We also learn that Iceland continued to be icebound at the commencement of July, with falls of snow as late as the 4th and 5th of July. Whilst observations further eastward within the Arctic circle record warmer and finer weather than we have in England.

We are apt to forget that dry and hot summers, if not the exception, are by no means the rule in this country, and that the calm bright weather with clear brilliant sunsets, which are general in Italy during summer in most years, is only occasional in this climate. Byron says of a southern sunset:

> "Not as in northern climes, obscurely bright,
> But one unclouded blaze of living fire."

The very greenness and beauty which distinguishes our Isles results from the storms and showers with which our short summer is interspersed. I append the following tables of Rainfall (May to September, 1859—1881), and I have also a table of hay and corn harvests since 1771, as well as in a few earlier years. For this I am largely indebted to an unpublished record I have by me, made with scarcely any intermission from 1771 to 1813, which being made at Stroud, a place

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comparatively near us, may be considered as representative of our district during that time. The other authorities include Mr. Glaishier and the late Mr. Howard, well-known writers on the subject.

A careful inspection of these tables will, I think, show that while the present summer has been exceedingly wet and showery, similar weather has previously occurred. As regards hay-making between 1771 and 1816, it is recorded as good in 19, bad in 13, and difficult or late in 11 years, so that there seems to have been the same fickleness of climate to contend with 100 years ago as now. There is also evidence that dry and wet seasons follow each other in succession, but seldom for more than three years together. When June and August are wet, July is generally drier. This was not the case however in 1879, although it was prominently so in 1852 and 1860. When July is wet, August is generally dry, and the reverse; but a wet June is not infrequently followed by a July of a similar character, especially in the first half of that month. Really bad corn harvests like those of 1698, 1799, 1816, 1848, and 1879, are happily very rare, and after all it must be acknowledged that our harvests seldom really fail; nevertheless, we do not sufficiently recognise the uncertainty of our climate and the probability, from past experiences, of trouble and perplexity in gathering our crops; and this seems to point to the need of increased endeavour to provide, by mechanical or other means, an escape from the difficulties which weather introduces into our farming operations.

Hoping that the day will continue fine for our excursions and be the precursor of a delightful season, I must apologise for having detained you so long.

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RAINFALL AT ROSS, MAY TO SEPTEMBER, 1859—1881.

Year	Temperature. Average Maximum.					Mean for 5 months.	Temperature. Average Minimum.					Mean for 5 months.	Temperature. Mean of Max. and Min.					Mean for 5 months.
	May	June	July	Aug.	Sept.		May	June	July	Aug.	Sept.		May	June	July	Aug.	Sept.	
1859	65·7	72·9	80·5	73·0	65·1	71.4	46·2	53·4	57·4	55·0	48·8	52·2	55·9	63·1	68·9	64·0	57·0	61·8
1860	64·7	62·4	69·0	67·2	63·5	65·4	46·2	47·7	50·7	52·0	44·0	48·1	55·4	55·1	59·8	59·6	53·7	56·7
1861	64·6	70·4	69·2	71·0	65·0	68·0	41·6	51·1	51·1	51·7	45·3	48·2	53·1	60·7	60·1	61·3	55·1	58·1
1862	66·0	67·1	70·1	70·2	63·6	67·4	48·4	48·7	50·3	52·4	50·3	50 0	57·2	57·9	60·2	61·3	56·9	58·7
1863	64·0	67·8	74·3	71·3	60·6	67·6	44·2	50·2	51·7	54·2	44·2	48·9	54·1	59·0	63·0	62·7	52·4	58·2
1864	65·7	68·3	74·0	71·7	66·0	69·1	48·5	49·8	51·7	49·4	48·6	49·6	57·1	59·0	62·8	60·5	57·3	59·3
1865	65·9	75·9	75·0	70·6	73·3	72·1	47·2	53·7	54·6	49·9	50·3	51·1	56·5	64·8	64·8	60·2	61·8	61·6
1866	63·6	72·7	74·2	69·6	63·0	68·6	39·7	48·0	50·9	50·8	48·2	47·5	51·6	60·3	62·5	60·2	55·6	58·0
1867	65·0	70·1	72·7	73·1	66·7	69·5	43·3	48·0	50·2	51·8	49·7	48·6	54·1	59·0	61·4	62·4	58·2	59·0
1868	71·1	76·5	80·5	72·1	68·8	73·8	45·3	47·7	52·9	52·5	48 5	49·4	58·2	62·1	66·7	62·3	58·6	61·6
1869	60·5	68·5	76·9	72·4	67·4	69·1	42·3	45·4	51·1	49·2	50·3	47·7	51·4	56·9	64·0	60·8	58·8	58·4
1870	65·3	74·1	78·0	73·3	66·9	71·5	43·0	49·7	54·3	49·8	45·1	48·4	54·1	61·9	66·1	61·5	56·0	60·0
1871	63·9	65.4	70·4	76·1	63·0	67·8	40·9	46·6	51·3	51·0	47·5	47·5	52·4	56·0	60·8	63·5	55·2	57·6
1872	61·0	70·9	76·3	72·1	65·5	69·2	41·1	47 3	52·7	50·7	47·7	47·9	51·0	59·1	64·5	61·4	56·6	58·5
1873	63·0	68·8	74·3	71·4	62·5	68·0	39·4	49·0	50·1	51·9	44·3	46·9	51·2	58·9	62·2	61·6	53·4	57·5
1874	61·4	68·9	76·4	69·9	65·4	68·4	39·9	46·1	51·5	50·4	48·5	47·3	50·6	57·5	63·9	60·1	56·9	57·8
1875	66·0	63·5	67·5	71·5	67·6	67·2	43·9	48·0	49·4	52·3	51·7	49·1	54·9	55·7	58·4	61·9	59·6	58·1
1876	60·8	70·1	77·4	74·0	64·2	69·3	38·8	48·5	55·3	52·5	49·3	48·9	49·8	59·3	66·3	63·2	56·7	59·1
1877	57·3	70·6	68·2	68·6	61·6	65·3	40·7	51·4	51·9	53·0	44·6	48·3	49·0	61·0	60·0	60·8	53·1	56·8
1878	62·3	70·7	73·7	70·1	65·8	68·5	47·2	51·8	53·6	55·2	48·4	51·2	54·7	61·2	63·6	62·6	57·1	59·8
1879	58·1	64·0	65·6	67·0	61·5	63·2	40·8	49·1	52·4	52·7	47·0	48·4	49·4	56·5	59·0	59·8	54·2	55·8
1880	62·1	65·9	69·8	71·6	68·2	67·5	41·9	48·8	53·7	55·4	51·5	50·3	52·0	57·3	61·7	63·5	59·8	58·9
1881	65·5	66·5	73·0	66·3	63·9	67·0	43·7	49·0	53·5	50·1	47·8	48·8	54·6	57·7	63·2	58·2	55·8	57·9
1882	64·4	65·5	69·1	70·0	...	...	43·4	48·1	51·7	51·7	...	...	53·9	56·8	60·4	60·8	...	...
Means	63·7	69·0	73·2	71·0	65·2	68·6	43·3	49·0	52.3	51·5	47·9	48·8	53·5	59·0	62·7	61·3	56·5	58·7

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Rainfall. May		Rainfall. June.		Rainfall. July		Rainfall. August		Rainfall. September		Rainfall. Total.		Year
Depth	Days	Depth	Days	Depth	Days	Depth	Days	Depth	Days	Depth	Days	
1·80	10	2·05	14	1·70	10	2·90	10	3·33	19	11·78	63	1859
2·47	16	5·67	27	1·85	13	4·14	28	2·29	16	16·42	100	1860
1·41	9	2·02	16	4·78	23	1·09	12	1·80	14	11·10	74	1861
4·33	14	2·81	13	1·56	11	1·44	9	4·29	12	14·43	59	1862
0·88	9	4·66	17	0·50	4	2·70	20	2·52	19	11·26	69	1863
0·71	9	1·29	16	0·75	7	0·75	8	2·69	21	6·19	61	1864
2·80	16	1·44	5	2·44	14	3·23	13	0·07	2	9·98	50	1865
0·86	11	2·54	14	0·90	10	3·48	15	5.91	28	13·69	78	1866
2·94	13	0·94	7	3.68	15	1·91	13	1·84	12	11·31	60	1867
1·63	13	0·33	3	0·41	2	4·27	18	4·42	11	11·06	47	1868
4·43	19	0·95	7	0·54	9	0·91	8	5·85	15	12·68	58	1869
1·22	8	0·55	8	1·16	10	1·17	7	1·65	10	5·75	43	1870
0·92	5	2·28	15	4·20	19	2·35	7	6·62	13	16·37	59	1871
1·82	13	3·25	21	7·74	13	1·74	15	1·81	15	16·36	82	1872
2·00	16	3·78	14	2·35	20	3·50	20	1·49	13	13·12	83	1873
0·63	9	1·30	8	1·47	12	2·17	17	4·29	19	9·86	65	1874
2·43	14	2·62	16	6·76	17	1·73	16	2·99	19	16·53	82	1875
0·64	8	0·67	10	1·28	9	2·47	12	6·86	24	11·92	63	1876
2·51	15	1·55	15	2·85	15	3·53	22	2·48	8	12·92	75	1877
4·80	26	2·44	17	1·02	6	7·96	19	2·07	14	18·29	82	1878
2·62	14	5·47	26	2·80	18	5·78	17	3·43	15	20·10	90	1879
2·01	9	3·23	23	5·96	24	0·30	4	3·62	15	15·12	75	1880
2·15	12	2·90	19	1·53	15	4·77	21	1·41	14	12·76	81	1881
2·01	12	2·51	21	4·63	25	2·37	16	...	...	...	...	1882
2·08	13	2·39	15	2·62	13	2·78	14	3·21	15	13·00	70	Means

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Woolhope Naturalists' Field Club.

ON THE MOULTING OF *ORGYIA ANTIQUA*.

By T. A. Chapman, M.D., Burghill, Hereford.

The *Orgyia Antiqua* is one of our very commonest insects, and a small detail in its life history is the subject of the note which I propose to lay before you. Though the matter is thus apparently trivial, I hope that it may not be regarded as unworthy of the Woolhope Club, as I think it will throw a little further light on a subject that has not been much elucidated, and as no fact concerning life in any, even of its lowest forms, is devoid of interest, as helping us to a fuller understanding of its processes in those higher forms which more personally concern us.

All insects undergo certain so-called transformations—in other words, they cast their skins at certain intervals, and make their growth by being thus provided with a new and more expansible integument, and as each skin admits of no other change than expansion, a certain amount of the change from the embryonic to the perfect condition is effected, apparently and, to a certain extent, really, *per saltum*, at each change of skin.

The first change is from the egg to the larva stage; the larva changes its skin several times, the pupa state is then assumed, and then that of the perfect insect.

The change, first from the egg to the larva, from that to the pupa, and then again to the imago, are all very distinct and definite in character; but the changes occurring when the larva changes its skin and becomes a size larger are less striking, and it becomes of interest to determine how far they are and how far they are not, of as definite a character as the change to pupa or to imago.

It is unquestionably the case that in very numerous species of insects, the larva changes its skin or moults a definite number of times, and the larva after each moult is quite distinct in some respect from its condition at other stages, and is, indeed, as definite and distinguishable after each moult as the pupa or imago is.

In a very large number, perhaps the majority, of species in which the facts have been recorded, the definite number of moults is four. This is the case in many Bombyces, and Sphinges, and some Noctuæ. I have recorded in our Transactions that this is the case in the worker of the common wasp, and curiously enough, I have recorded in the same place the smallest number of moults that occurs in any larva that I know of, viz., two, in the case of *Rhipiphorus Paradoxus*.

Five moults would appear to obtain in not a few Lepidoptera, and so many as ten and eleven have been observed in some species.

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Then we come to such records as this "*Arctia Caja* moults from five to ten times," and Boisduval tells us that many hairy species of larvæ vary in the number of their moults; and other statements have been made, apparently with a large foundation of truth, but all that I have met with have been, so far, vague, and quoted from author to author for so long a time, that it is difficult to attach much value to them, although it is very possible that fuller and better facts are to be found in journals and periodicals (especially Continental) which I have no means of consulting.

Last year, my friend Mr. Hellins (Rev. J.) recorded that he had found certain larvæ of *O. Antiqua* vary in the number of their moults, and I determined this year to verify the matter, with a view to understanding it more clearly. I accordingly secured several batches of the eggs of this species, and have reared a number of larvæ with that object.

Without troubling you with dates of hatching, moulting, &c., which are of no importance except to enable me to secure accuracy of observation, I may at once say that some of my larvæ moulted only three times, some four times, and some five times.

In its first skin, the larva is very definite and easily distinguishable (apart from size) from those in the following skins, being very similar to an Arctia larva; that it possesses a set of tubercles set with bristles, each tubercle and the hair it carries being very similar to its fellows. It differed from Arctia in one very important point, viz., that each segment had only ten tubercles instead of twelve, as in Arctia; and in a more conspicuous though less important matter, namely, that the lateral tubercles of the second segment were very prominent and large. But it has no trace of the tufts of barbed hairs afterwards carried, nor any trace of the scarlet tubercles of the 10th and 11th segments, though traces of these and some coloration are distinguishable shortly before the first change of skin.

In the second skin it is equally distinct and definite. It is now clearly of the Liparis family. The scarlet cups of the 10th and 11th segments are very distinct, the lateral tufts of the 2nd segment are represented by a few long special pairs, and the dorsal brushes of the 5th and 8th segments are represented by black pads (fused tubercles), with a few special barbed hairs; all the hairs are still black.

In the third skin the majority are easily distinguishable. The sub-dorsal tubercles are now pink, the barbed tufts are distinct on 2nd dorsum of 5th and 8th segments, and in 12th segment. The tufts of 5 and 6 are dark—from fuscous to black; those of 7 and 8 are pale.

In the fourth, fifth, and sixth skins, the dorsal tufts are pale in colour, and the lateral tufts of 5th and 6th segments appear, though the latter are wanting in some, and in some there is a distinctly darker shade on the dorsal tufts of the 5th and 6th segments.

It thus happens that in a few of these in the third skin, there is a slight approach to the panoply of the 4th skin: some specimens approach the appearance of the 5th; so that whilst the majority are abundantly distinct in these skins, in a few it is impossible to decide to which skin they belong.

From the fourth skin onward, they are indistinguishable, although in the later

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skins the larvæ are more certainly furnished with the lateral tufts, and the dorsal tufts are more certainly of a uniform tint. But a larva in its fourth skin may be as mature in these respects as one in its sixth.

The three first skins therefore seem to be definite and fixed forms—the variability in moulting occurs in the later stages. When we come to inquire into the significance of this variability, we meet at once with one very decided fact, and that is that those that moult only three times always produce male moths; those that moult five times always produce females; those that moult four times produce both.

We may go one step beyond this. The apterous females of *O. Antiqua* render in this instance more than usually marked the circumstance that is usual amongst insects, that the female is much larger than the male, from the fact that she contains a large number of eggs. There is another circumstance that is also usually associated with this fact, and that is that the male emerges from the pupa a few days before the female.

Now, if we take the four moulters, consisting of both males and females, this is not so; the females emerge first. But if we associate them in this order—

{ 3 moulter males
{ 4 moulter females

{ 4 moulter males
{ 5 moulter females

—we find that the usual rule of the males emerging first is observed.

This also shows more distinctly that another rule obtains in *O. Antiqua;* it is one that obtains among bees, and would, I think, be found in other insects, if observation on the point were made; it is this, that the male, though feeding as larva a shorter time (being a smaller insect), remains a longer time in the pupa state than the female, apparently requiring a longer time to undergo its full development.

It would thus appear that in *O. Antiqua* the female moults one time more than the male, a circumstance that I have not seen noticed as occurring in any species; and that, further, the moults may vary by one.

I do not think my observations justify any conclusions as to the circumstances governing this last point.

In a set of larvæ reared carefully, the 3 male 4 female moulters were fully as numerous as the 4 male 5 female moulters; but in a set reared carelessly, in so far that many were kept in one vessel, and their food being taken from different trees (always pear) at different times, was sometimes obviously unpalatable, there were hardly any 3-4 moulters, but there was a large mortality among these, and it is equally possible to conclude that the hard conditions of life killed the 3-4 moulters, as that they changed them into 4-5 moulters.

This point, then, remains for further investigation, and I hope some of the younger and more enthusiastic members of the Club will take it up.

What determines whether or not a larva shall moult the additional time? Is it already predetermined before it leaves the egg, or does it depend on conditions of weather, feeding, &c.? Would it be possible by selection to raise a race of

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Antiqua consisting entirely of 3-4 moulter, or again of 4-5 moulter, or of 4 moulters only? Do such species in any way occupy an intermediate position between others moulting, on the one hand, four times, and, on the other, five times as a fixed number?

Several species which hibernate in the larval stage, are known or believed to vary in the number of moults, and hairy larvæ which are said to vary in the number of moults, include many species that hibernate as larvæ. It is, therefore, of interest to note that *O. Antiqua*, though not hibernating, is closely related to several species that do so, such as the *O. fascelina*, common on northern moors, and the allied Arctia species which is believed to pass more than one winter in the larva state.

If hibernation and variation in moulting are related, it would appear probable that the additional moults are a provision for prolonging the duration of the feeding period after an exceptionally bad time during the winter, and that the number of moults in any individual may vary according to its requirements determined in this manner; or, on the other hand, a less number of moults may represent what occurs in many species, viz., a rush to reach the perfect state as early as possible, and so escape hibernation, and to become double-brooded.

This suggests the inquiry whether the summer-broods of such species as Lunaria and Illunaria, which are smaller than the type and have been described as distinct species, moult as often as the autumn brood.

Further investigation thus promises to throw valuable light on several questions concerning variability. An isolated observation on the rare *Acronycta alni* bearing on this matter may be worth mentioning. A few eggs were given me from which I reared five larvæ. In its first stages this larva is remarkable from its exact resemblance to the dropping of a small bird. On its last moult, a great transformation occurs, and it is now velvety black, with golden yellow dorsal lozenge-shaped marks and curious clubbed hairs. Now four of my larvæ moulted four times, but the fifth moulted rather earlier than the others, so as to gain two days in four moults, in moulting the fourth time did not assume the adult livery, but was still in the bird-dirt stage, though larger than its fellows in that stage, and possessing the full complement of clubbed hairs, although they were pale and slender. It moulted an additional, or fifth time, and then assumed the adult plumage, and was larger than the others were, and had the clubbed hairs one millimetre longer than theirs, and remained feeding four days longer.

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THE PONDWEEDS OF HEREFORDSHIRE.

By the Rev. A. Ley.*

I am to limit myself to-day to a single class of plants; and I choose for my remarks one which is not a favourite for study even amongst professed botanists; while in the affections and attentions of the outside world, I do not think they occupy any place at all, not even that of Docks, Goosefoots, and Nettles,—for I should not be surprised if some of my listeners had never heard of them before. Thus they stand in unenviable contrast to the plant of history and lore, of curious form and unique odour, the *Asarabacca*, with which Dr. Bull fascinated our ears at our last meeting.

The subjects of our present remarks are denizens of ponds, ditches, and rivers. We botanists call them *Potamogetons;* which I should prefer to-day to english as "Pondweeds." Very few botanists "take up" the Pondweeds. They are ugly (at least until you look closely into them, but not then); they often grow in ugly places—ditches, canals, and so forth. Then too, they are hard to get at; and they share for that reason the neglect of other deep-water plants. It is not every botanist who is ready, even on a July or August day, to wade—perhaps swim—in a muddy ditch or pool for a Pondweed. Ten to one, there is no boat to be had; and the consequence is either that they are passed by altogether, or that a few wretched scraps are dragged out with the umbrella-handle, or walking stick, and do duty as representatives of the Pondweeds in otherwise well-appointed herbaria.

Still for all this (shall I say for this very reason?) there are both rare and interesting Pondweeds. It is with a view of inducing some to look for them, that I have ventured upon this subject to-day.

The genus is represented (taking Dr. Joseph Hooker in the *Student's Flora* as our guide) by about 50 known species, in the world. Of these, some 14 are British; but the 14 species are brought up in the last edition of the *London Catalogue of British Plants*, by the enumeration of sub-species and varieties, to 30 names, representing plants more or less different. Considering the complete absence of all that can be called fen, or fen-ditches, and the comparatively small area of pool or canal in the county, I do not think that Herefordshire is badly represented in Pondweeds.

We may divide these 30 names, with sufficent accuracy for present purposes, into 11, representing plants possessing broad leaves both submerged and floating, but the latter of dissimilar shape and texture from the former. Of these we have three or four—*natans*, *polygonifolius*, *salicifolius*, and perhaps *rufescens;* the first alone in abundance. Then there are eight with only submerged leaves, but still broad—of which we have six; *lucens* with its varieties *acuminatus* and *decipiens*,

* This paper was read by the Rev. A. Ley on June 17th, 1881, and ought to have appeared on page 46.—The manuscript, so long lost, has only just been recovered.

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perfoliatus, *crispus*, and *densus*—most of these abundantly. Last come 11 with leaves linear and grass-like. Of the grass-leaved forms we have six; *obtusifolius*, *mucronatus*, *pusillus* and *tenuissimus*, *pectinatus*, and *flabellatus*. *Pusillus* alone of these is widely spread in Herefordshire; the rest are rare or local. Thus it will be seen that of the 30 plants in this genus known in the whole of the British Isles, Herefordshire is known to possess 15 or 16—just half. Among these is one of the very rarest of all, not known elsewhere in the British isles: and it is of this one, together with a few other of our less common species that I proceed now to speak.

In doing so I want to bespeak the particular attention of botanists who have any opportunity of giving it, to the Pondweeds of the river Wye during the present summer—bidding fair as it does to be one of exceptionally low water and unusual probability therefore of obtaining Pondweeds in flower and fruit. I now mention one or two rarer species in order.

Potamogeton polygonifolius. This widely distributed plant is quite a rarity with us. The moorland form with small neat leaves is still a desideratum; but a form of this plant almost equalling *P. natans* in the size of its upper leaves exists in several spots. It used to occupy the Dam pool on Howle hill near Ross, and now that the pool is destroyed, it is still to be found in the stream which supplied it. I found it last year, fruiting, in the Grwyne valley; and I saw it this spring occupying ditches in what is left of Moseley Mere and Kingswood Common near Kington. The moorland form should be met with on the Llanthony hills; but I never succeeded in finding it there, until a few days ago, when I stumbled upon it in the head of the Olchon brook where it is still a moorland rivulet.

Potamogeton rufescens. Mr. Crouch has furnished me with a fine fruiting specimen of this plant. Unfortunately, the station at which it was gathered was forgotten. It will therefore rest with the diligence of local botanists, especially in the north-western districts of the county, to settle whether it is to be placed on our Herefordshire lists or no.

Potamogeton salicifolius, *Wolfg*. This very rare plant can now I think be accepted as an undoubted inhabitant of the Herefordshire Wye. I have an old specimen gathered by Mr. Purchas in 1854 at the New Weir, Great Doward, to which he does not with certainty assign any name. I gathered it myself in 1866 at Sellack, and misnamed it the utterly different '*crispus*.' In 1877, I sent it to Prof. Babington, who gave it the name of '*salicifolius Wolfg*.' under which name I sent it to the Exchange Club in the following year. No comment was vouchsafed upon it by the authorities of the Exchange Club: but last year I had, through the courtesy of Mr. A. Bennett of Croydon, the benefit of the opinion of the Rev. T. Morong, an American botanist, who is now monographing this genus, upon the Wye plant. He writes as follows: "This plant you say Dr. Boswell regards as equalling our *P. Lonchitis*, *Tuck.*; I should disagree with him decidedly. It certainly is not our *Lonchitis*. But I have no doubt that it is *P. salicifolius*, *Wolfg*. I have laid it side by side with specimens of that from Sweden (so named by the botanists of Upsala), and they are as nearly alike as two peas. Neither of these are in fruit, however; but if their fruit should prove

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unlike, I should never trust in other characters again." Mr. Bennett commenting upon this in a letter to myself says: "I agree, and I differ from him. It is not the typical plant of Wolfgang, as I have seen specimens named, and from Wolfgang himself, from Lithuania and Russia. But I suspect it to be the Scandinavian *P. salicifolius var. lanceolatus* of *Hartmann's Flora.*" I have only to add that the fruit of this Pondweed should be searched for diligently in the Wye. In certain seasons the plant is to be found abundantly in spots in the Ross district, and flowers freely: but I have been unable to detect it in fruit.

Potamogeton lucens L., var. decipiens. In 1876 I sent up to Mr. Baker, of Kew, a very broad-leaved Pondweed from the Wye near Sellack, doubtfully naming it thus. Mr. Baker confirmed my supposition as to its name: but Dr. Boswell (in the *Report* of the Exchange Club for that year) contested the accuracy of this determination, on account of the serrated margin of the leaves, and the small fibres, and was inclined to call it *nitens Web.*—a name which Dr. Bull, who had seen fresh specimens, had previously suggested for it. But both Mr. Bennett, and Mr. Morong, to whom the plant was submitted last year, call it "*decipiens,*" and disagree in toto with Dr. Boswell's name of "*nitens.*" I cannot help, myself, believing it to be rightly named "*decipiens*"—with which it closely agrees in general habit and character. I have only noticed it in two spots, both near the railway bridge over the Wye at Strangford; nor have I been able to find the fruit, though it flowered in 1876. I trust that this season something more of these Potamogetons may be seen. The continued high waters of the last three summers have however so much changed the river bed, that last summer not a trace of either of them was to be found at their old habitats. But no doubt they are only awaiting a favourable season, such as the present, to reappear.

One or two brief remarks upon two more species, and I have done. The two grass-leaved species, *obtusifolius* and *mucronatus*—the latter quite a rarity—both of them owe their place in our County Flora to the diligence and close observation of our friend Mr. Burton Watkins. Of *obtusifolius* I have only to say that it is curiously enough confined to one corner of the county—namely the parishes of Llangarren and Welsh Newton—but in these it is abundant. I will not suggest the explanation that this is the neighbourhood in which Mr. Watkins lives, lest other botanists should think I was insulting them; and after all this can only be a partial explanation, since Mr. Purchas never found it in the Ross district. *Mucronatus* is an inhabitant solely of the Hereford and Ledbury canal, where it was found first by Mr. Watkins at Westhide, and afterwards turned out to be abundant nearer Hereford. This year I see it fine and abundant in the canal opposite Barr's Court railway station, where I may mention to our Hereford friends this plant is just at present in fine flower and fruit.

I have now only to thank you in behalf of my mud and ditch friends for your patient hearing: and to assure you on their part, that if you will not mind soiling your boots for them in July and August, they will repay you with a rich harvest for your collecting cases and Herbaria.

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Woolhope Naturalists' Field Club.

OCTOBER 5TH, 1882.

THE FUNGUS FORAY ON CREDENHILL CAMP.

THE fourteenth annual meeting of Mycologists in Hereford has just been held with much success. The weather was happily fine during the whole week, and very interesting "forays" took place at the Whitcliff and Mary Knoll Woods, Ludlow, at Dinedor Camp, and at Haywood Forest, in addition to the one it is now our pleasure to record, and to which the whole of the members of the Club had been invited. The season for funguses is a very bad one. The cold, wet, ungenial weather in June, July, and August, was very unfavourable for mycelial growth, and thus the underground cells, from which mushrooms spring, were too weak to bear much fruit. The markets have been destitute of this favourite morsel, and the public deserve and receive the compassionate consideration of those learned mycologists who know where to find the delicate mushroom relish in funguses of all seasons, though ordinary mushrooms may fail people in general.

The members of the Club met in goodly numbers at the Free Library on Thursday morning, and four carriages well laden, started to make a "Foray among the Funguses" on Credenhill Camp. The hunting ground was known to be rich, for that curious agaric, *Gomphidium viscosum*, had been gathered there some ten days before, with a head nine inches across it, instead of the three or four which is its usual size; and the rare agaric, *Lactarius uvidus*, whose milk turns of a beautiful but evanescent lilac colour, took the size of a cheese plate. The enthusiasm created by these facts, however, could not be appreciated by everybody, so some bravely essayed to meet the many syllables of fungus names by talking learnedly of the vallum, the agger, and the fosse; whilst others babbled of tesseræ, hypocausts, coins, and Roman bricks, for history was in the field, and the air too was full of archæological anticipations.

On reaching Credenhill Court, Mr. and Mrs. Ecroyd received the Club very pleasantly, on hospitable thoughts intent, but no! firmly resisting all such temptations, the cry of "Forward" was quickly given, and the storm of the Camp began. The way was taken up the orchard beside the "covered way," which was soon crossed and the hill ascended obliquely, to the "five seats." Here the views of the surrounding country began to open out, and the climbers were glad to get their breath in admiring them, before separating into parties to follow their own inclinations. Mr. Ecroyd escorted one section and Miss Ecroyd guided another through the trees to the agger, whilst the fungus hunters disappeared in small parties, and some were last seen exulting over a fine group of the rare

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and beautiful fungus, *Agaricus (Pholiota) auricomus*. Thus the Camp was perambulated throughout; its agger, its embankments, its trees, and the views to be seen on all sides from it, were all examined and discussed with much satisfaction.

In the valley below the Camp on its northern side lies the ancient mansion of Brinsop Court, a moated residence of much antiquarian interest. Mr. Robinson in his "Mansions of Herefordshire," states that references to it exist from the early part of the thirteenth Century, and that the Daunteseys, or Danseys, held it from the fifteenth to the beginning of the present Century. According to a MS. account compiled for the Dansey family, the Court was "moated round and approached by a drawbridge; within the quadrangle was a chapel with a crypt beneath it, a dungeon, and a blacksmith's forge. The chapel, with the staircase leading to it, occupied one side of the square; it had a groined roof and walls painted in frescoes." . . . Two towers flanked the drawbridge, having grotesque figures on their tops—one being a monkey playing with a fiddle. In the inner court was a third tower which, though in a perfect state of preservation, was "pulled down about fifty years since (c. 1790) to assist in building a wall round the stables."

The President sallied forth from the north-west entrance to the Camp with a good following, to visit this interesting old mansion. It is now occupied as a residence by Mr. Dearman Edwards, but on application permission was very readily given to inspect its interesting features. The moat exists there still, and so, too, does the hall (called the chapel) which is extremely fine, and belongs to the early or middle part of the fourteenth Century. It is used now as a granary, but is still in good preservation. It is an upper room, built over a storehouse, having good two-light traceried windows, and a fire-place, now built up. Its chief point of interest, however, is its grandly beautiful timber roof, which indeed may vie with the best roofs of the period in this country. The great trusses which carry it are cut out of large oak timber with most beautiful outlines, and fine mouldings throughout. The eastern portion was plastered between the rafters and decorated with simple rosettes in red with a dark centre. The west end was close boarded under the rafters and decorated with a similar rosette placed between cross-lines of a dark colour. In this part also the roof timbers are richly coloured, indicating it as the place of highest dignity. There are also some remains of grotesque finials, which show an appreciation of the humorous side of life, and give the probability that merry times were held in this grand old hall.

The house was formerly occupied by Mr. Hutchinson, brother-in-law of the poet Wordsworth, who frequently visited here, and was sometimes accompanied by Southey. The poet thoroughly enjoyed the rural scenery of Herefordshire, and in an ode to his dearly loved sister occurs this verse—

> "Then come, my sister! come, I pray,
> With speed put on your woodland dress;
> And bring no book: for this one day
> We'll give to idleness."

There is a portrait of Wordsworth—a copy after Pickersgill—presented to the

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house by the Rt. Hon. and Ven. Lord Saye and Sele, to commemorate the poet's visits to Brinsop Court. A visit was afterwards paid to Brinsop Church, which was kindly shown by the Rev. W. R. Lawrence, the Vicar. It is an interesting example of late Norman, and Early Decorated work. Its chief feature is a twelfth Century group of St. George (the patron Saint) and the dragon, with several arch stones boldly carved with the zodiacal signs, and the figures of men and animals so much used at that date. There is a wooden belfry, a fine simple timber porch and two good figures in old glass, with divers coats of arms in the east window. Near the church and all round it certain irregularities exist on the surface of the ground which will be referred to further on.

The fungus hunters meantime had well searched the Camp and its embankments. There had been a considerable variety found during the week, although the numbers were few. The public will, of course, be all anxiety to learn their names, and mycologists will be able to judge of the peculiarities of the year, if a few of the leading groups are given.

The LACTARIUS group was represented by *turpis*, *torminosus*, *insulsus*, *blennius*, *circellatus*, *uvidus*, *pyrogalus*, *flexuosus*, *chrysorheus*, *piperatus*, *pargamenus*, *vellereus*, *deliciosus* (good, as its name indicates, if cooked à la tourtiére), *pallidus*, *trivialis*, *glyciosmus*, *vietus*, *subdulcis*, *serifluus*, *quietus*, *rufus*, *mitissimus*, and *lilacinus*.

The CORTINARIUS group was represented by *russus*, *calochrous*, *cærulescens*, *collinitus*, *elatior*, *tabularis*, *ochroleucus*, *caninus*, *cinnamomeus*, *torvus*, *hinnuleus*, *armillatus*, *paleaceus*, *hæmatochelis*, *impennis*, *acutus*, *cinnabarinus*, *triumphans*.

The RUSSULA group presented specimens of *nigricans*, *adusta*, *furcata*, *depallens*, *lepida*, *rubra*, *Queletii*, *vesca*, *cyanoxantha*, *fœtens*, *emetica*, *ochroleuca*, *fragilis*, *fellea*, and *alutacea*. Upon a decaying *Russula nigricans* was also found the interesting plant, *Nyctalis parasitica*.

A generous public must have mercy on the compositors, and though numerous other families might be given, a few more only must be named. Five specimens of *Strobylomyces strobiliformis* were found, always rare and interesting. A *Polyporus intybaceus* was sent from Cornwall; *Boletus bovinus* and *variegatus*, came from Guildford; and *Boletus cyanescens* was brought from the Wrekin. *Pleurotus dryinus* and *subpalmatus* were found in good form here. *Omphalia campanella*; *Collybia ambustus*; *Pholiota militaris*; *Flammula lentus* and *flavidus*; and here the list shall close.

At two o'clock most of the visitors were assembled in front of the Court to hear the following paper from Dr. BULL:—

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CREDENHILL CAMP—MAGNA CASTRA—AND THE ROMAN STATIONS AND TOWNS IN HEREFORDSHIRE.

"*Jam seges est ubi Troja fuit.*"

"For fresh and clear,
As if its hues were of the passing year,
Dawns this time-buried pavement. From that mound
Hoards may come forth of Trajans, Maximins,
Shrunk into coins with all their warlike toil;
Or a fierce impress issues with its foil
Of tenderness. The wolf whose suckling twins
The unlettered ploughboy pities when he wins
The casual treasure from the furrowed soil."

Wordsworth, on the Roman Ruins at Kenchester.

THIS grand Camp, which we have the pleasure of visiting to-day, cannot fail to strike you all by its great extent, by the beauty and variety of its scenery, and, above all, by the strength of its outworks. The hill rises to a height of nearly 500 feet above the level of the plain below, and it is 715 feet above the level of the sea. The Camp itself is considerably higher than the embankments surrounding it, and forms an oblong flattened mound, forty-five acres and one perch in extent. It is separated by a ditch, in some places many yards wide, from the first embankment, or agger, and the agger thus serves to mark out the Camp very distinctly, although it has been broken through here and there to quarry the stone of the hill, or to make ways to remove the timber which grows there so well. Upon this agger, a walk is made around the Camp, which is a mile and three quarters in length, and the views presented from it on every side of the hill, where the trees will let them be seen, are rich, extensive, and varied.

The Camp is well supplied with water. There is a spring on the eastern side issuing from the mound, which, from long neglect, has converted the wide ditch there into a bog, and formed a small pond. On the western side there is also another spring of water, with a pool of some size below it, which thus acts as a reservoir of water in dry seasons when the springs themselves might fail.

Three sides of the agger surrounding the Camp are nearly straight, but on the south-eastern side it follows the shape of the hill. The embankments are everywhere bold and strong, single on the eastern side, where the natural formation of the hill is steep, but double on all other sides, where the ascent is less abrupt. The agger on the inner Camp side varies from a few feet in height to twenty or thirty feet, where the approach is easy and a strong defence required. On the outer side the escarpment is steep, and often from sixty to seventy feet high. There were, probably, only two entrances to the Camp originally—one on the north-west corner, at the far end, and the principal entrance, strongly guarded, on the southern side. There is a covered way, a veiled military road, six feet wide, and deeply entrenched, which winds up the hill towards the west, and on reaching the outer fosse, it seems to divide, one branch passing along it by a gradual ascent to the entrance at the far north-west corner of the Camp, and the other turning sharply to the south with a much more steep ascent to the main entrance.

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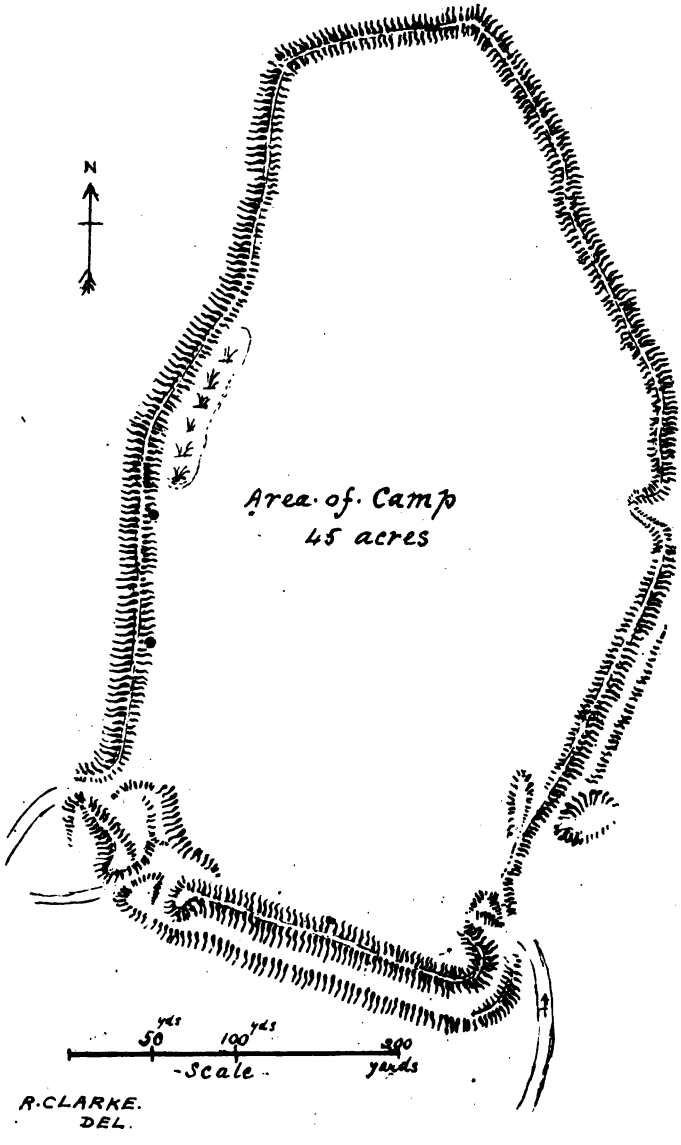
Woolhope Trans.
1882.

Credenhill Camp



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The Camp and its entrenchments are now almost covered with a forest of timber. Up the shoulder of the hill, on the western side, is an avenue of pollard oaks of some three or four centuries' growth, and since they are likely to remain a feature of the hill for some centuries to come, their circumference is here given. There are seven trees on each side, those on the right side, beginning from below, measure, respectively, 12ft. 1in., 9ft. 11in., 7ft. 4in., 8ft. 10in., 9ft. 3in., 9ft. 8in., and 9ft. 6in.; and those on the left side, beginning from below, measure 9ft. 7in., 12ft. 3in., 11ft. 6in., 9ft. 8in., 9ft. 3in., 10ft., and 12ft. 3in., taken at from three to four feet from the ground, where the circumference is smallest.

The early history of the hill and its entrenchments is involved in obscurity. It is generally believed to have been originally a British Camp, and it is thought also that there was a British town in the valley below. It is quite possible, and even probable, that both surmises are correct, though there is no proof whatever that it was so, and, if so, the British names of the town, the Camp, and the hill are lost in the obscurity of the past. There can be no doubt that the Camp was afterwards occupied and maintained by the Romans for some three centuries, and that the great strength of the embankments is due to them, if they did not originally construct them, as some authorities believe. The Romans also built the town in the plain below, on the site of the British town, as some think, and it is beyond question that the Camp and the town together formed the great central Military and Civil Station for the subjugation and management of this district by the Romans.

There is so much confusion, so little real history, with reference to the struggles and party warfare that took place during the two or three centuries after the departure of the Romans, that any attempt to connect the sequence of events, or even of rulers, may readily be called in question. There is some reason to believe that this Camp was occupied for a considerable time by the Saxons, under Creda, the first king of the Mercians, and this inference is supported by the name it now bears of "Credenhill," or "Creda's hill," for which indeed there is no other known derivation. Creda, it is surmised, destroyed and burnt the town, and occupied the Camp itself with his forces. The Saxons are believed by tradition to have made, or very much widened, the inner ditch of the Camp, possibly to strengthen the embankments with the earth removed. The roads made in all directions through the country, from this centre, would be equally convenient to the Saxons as they had been to the Romans who formed them.

Very little remains of any kind have ever been found in the Camp, or upon the hill, but when the Camp is drained, which it so sadly wants, and when the leaf mould of so many centuries is trenched to mix with lime, as it probably soon will be, in preparation for rhododendrons, and when the pond, too, is cleaned out, the greatest care will no doubt be taken to preserve all remains that may be found, and which may possibly afford more direct evidences of its occupation and history than exist at present. The most likely place, however, to find remains of its former occupants, would be on the upper part of the mound, where the surface is very irregular, and where pits or hollow places are seen. It is quite possible, nay,

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even probable, that the main buildings of the garrison would be situated here; and a trench, three or four feet deep, would detect any foundation that might remain.

One circumstance is very remarkable with reference to this Camp, which is, that neither history, nor tradition, nor the existence of any tumuli in the vicinity, lead to the belief that it was ever attacked, or that any great struggle ever took place in its vicinity. This may possibly be due to its size being too large for a small body of men to attempt to hold, and its entrenchments too strong to be attacked when the Camp was fully garrisoned. The town of Magna Castra, we know, was burnt and utterly destroyed, but it is probable that its inhabitants had fled, or at any rate, offered but little resistance, and so all trace of the event is lost.

In the narrow valley of Brinsop, between Credenhill and Merryhill, is a portion of ground, under two acres in extent, which has formerly been a Camp, or fortified inclosure. It is considerably higher than the surrounding ground, and is protected on the north and western sides by an embankment from eight to ten feet high, and by deep watercourses on the east and southern sides. The church and churchyard occupy the southern portion of the inclosure. On the western side is an orchard, and on the north side a portion of the field, which are both surrounded by a deep ditch, and might readily be further protected by a stockade. An embankment runs directly from this traditionally called Camp across the valley, which seems to have been made to form a mill-dam, and this is borne out by the nature of the ground, and the fact that in the parish map the field is called "The Lower Stank Field." The entrenched Camp may have been a Roman outpost from Magna Castra, but there is no actual proof that it was so. It seems more probable that it formed a Saxon inclosure at a much later period.

It is as a Roman Camp and Roman town that the chief interest attaches to Credenhill and Magna. Britain was the latest of Rome's conquests in the west, and it was governed from first to last by Roman military and financial administrators, whose power was comparatively unlimited. It was a despotic government, but it secured peace and good order. Commerce sprang up; harvests were abundant; tin, lead, and iron mines were worked; roads were extended in all directions; and the towns which sprang up during the nearly four hundred years of their rule prove how rapidly Britain become incorporated into the general empire. Before the invasion of the Romans, the British had begun to leave the more barren downs, and clear away the woodlands to get richer soil for cultivation, and the Romans naturally took advantage of their clearances. The situations of the Roman towns, however, were chiefly regulated by military considerations. They were governed by their own municipal officers, and, in all dangerous localities, were guarded by massive walls. The Roman station and town population existed as a thing apart from the Britons. Their laws, their language, their political and social life, were all of Rome. The Latin language was spoken in them, and such Britons as resided there had to accommodate themselves to it. The Britons, on their side, remained also quite apart, with their own language, their own chiefs, and, as was proved on the departure of the Romans, their own laws. It was thus a military occupation. The chief monuments found relate to military life, and

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the inscriptions and tombs are those of soldiers. "The harshness of a climate," says Mr. Green in *The Making of England*, "that knew neither the olive nor the vine, deterred the men of the south from coming here, and the care with which every villa was furnished with its elaborate system of hot-air flues, shows that the climate of England was as intolerable to the Roman provincial, as that of India, in spite of punkas and verandahs, is to the English civilian, or the English planter." (p. 7.)

At the close of the Roman rule, in spite of its roads, its towns, and its mining works, Britain remained but a half reclaimed country, whose surface was chiefly occupied by a vast extent of forest and waste land. This was especially the case in the Silurian district which this great military station controlled. Here, to the last, the natives regarded the invaders with the utmost hatred, and could only be controlled by the actual presence of the military force.

On the departure of the Roman Legions (A.D., 411) the inhabitants were left to their own resources. The towns already provided with rulers for a long time held their own. Those which had not walls for their protection were provided with them, and the towns ruled over the adjacent districts. This could not long continue, and the country soon became a prey to the marauders that the Roman soldiers had kept in check. The Picts and Irish pirates, the Jutes and the pirates from the northern seas, soon produced such devastation, that the towns uniting called in the Saxons from Holstein (A.D. 477) and the Angles from Sleswig (A.D. 540) to oppose them, with the result, as history tells us, that they soon seized the country for themselves. Britain was broken up into a congeries of states, all struggling for supremacy, with the fierceness that gave rise to the proverb "Britain fertile in tyrants."

The destruction of the towns and stations established by the Romans on the Welsh border became universal between Deva (Chester), Glevum (Gloucester), and Gobanniun (Abergavenny). They were all, without exception, sooner or later, according to their own power of resistance, stormed, pillaged, and burnt, and the inhabitants who resisted, or were unable to escape, were murdered remorselessly. History has preserved to us a brief record of the fate of Uriconium, the Viroconium of Ptolemy (Wroxeter), which was the largest and most important of them all. Mr. Green in his work, *The Making of England*, gives this account of it. In A.D. 583 Ceawlin, King of the West Saxons, having overcome the combined forces of the rulers of the cities of Corinium (Cirencester), Glevum (Gloucester), and Aquæ Solis (Bath), with the men from the wide district under their control, at the battle of Deorham, pushed up the valley of the Severn, through the Forest of Wyre, and reached Uriconium. This town was seated at the base of the Wrekin, not far from the banks of the Severn. "The walls of the town enclosed a space more than double that of Roman London," says Mr. Thomas Wright, in his *Guide to Uriconium*. Its broad streets contrast strangely with the narrow alleys of British towns. The remains of its forum, its theatre, its amphitheatre, prove its wealth and importance. Ceawlin stormed the town, and its very existence came to an end. Its ruins show that the place was

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plundered and burnt; while the bones which lie scattered among them tell their tale of the flight and massacre of its inhabitants, of women and children hewn down in the streets, and wretched fugitives stifled in the hypocausts, whither they had fled with their little hoards of money for shelter. A British poet, in verses still left to us, Llywarch Hen, in his *Elegy on Kyndylan*, sings piteously the death-song of Uriconium, "The white town in the valley," the town of white stones gleaming among the green woodlands. The torch of the foe had left it, when he sang, a heap of blackened ruins, where the singer wandered through halls he had known in happier days, the halls of its chief Kyndylan, "without fire, without light, without song," their stillness broken only by the eagle's scream, the eagle "who has swallowed fresh drink, heart's blood of Kyndylan the fair."

There is every reason to believe that the Roman stations and towns in Herefordshire were destroyed and burnt in a similar manner; and though history is silent upon it, the inference is very strong that the Anglian chief Creda, "Crida," or "Creoda," as his name is differently spelt, who is believed to have occupied Credenhill Camp for some years, to have widened its ditches, and strengthened its entrenchments, was the destroyer of them all. Creda was the first King of Mercia, or the district of the Marches, and the destruction of the Roman stations and towns would be a necessity for him, in order to secure his own position. Creda is supposed to have ruled from A.D. 583 to 600, which seems to point out the date of the destruction of Magna, Ariconium, Cicutio, Blackwardine, Bravinium, and all the other small Roman Stations that may have existed in this county, as having occurred at the end of the sixth century.

The solid structure of Roman masonry could not be destroyed by fire. The woodworks and roofs might be burnt, and the contents of the buildings reduced to ashes, but the blackened walls would remain, and the most remarkable circumstance is that they should continue to remain not only unoccupied, but almost untouched for centuries. They were left desolate, to become overgrown with brambles and bushes, and to be the haunt of the wild beasts, which at that time abounded in the woods. Mr. Thomas Wright attributes this singular neglect to the strong superstition of the people. "The Teutonic invaders," he says, "had a prejudice against towns. They believed the deserted buildings were taken possession of by powerful evil spirits, on whose limit it was highly dangerous to trespass" (p. 18). He supports this theory by several arguments. When Augustine and his missionaries came over in 597 to convert, once again, the Anglo-Saxons to Christianity, the Kentish King received them in the open air, lest the strangers from Rome should cast a spell upon them within walls. Again, in all the Benedictionals of the Anglo-Saxon period are special forms for blessing the vessels of metal or earthenware found in the ruins of the towns, to relieve them from "pagan spells." Again, when the little bronze figures we prize so much were found, the people mutilated them to save themselves from personal danger, and threw them into the nearest river; and they regarded inscriptions on stones as magical charms and defaced them also. There are also various legends of the period which bear out the supposition.

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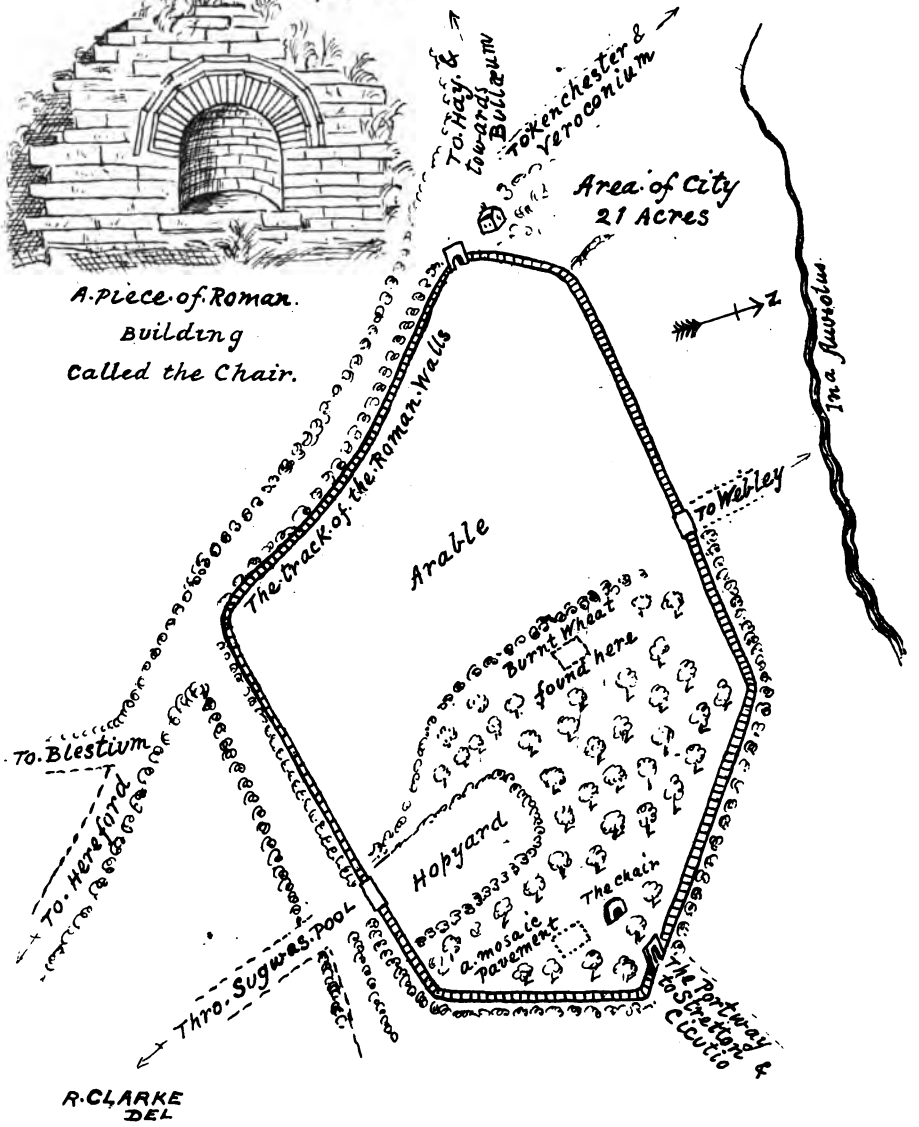
MAGNA · CASTRA. Woolhope · Trans.
Represented · by · Stukeley · as 1882.
Ariconium
Sep. 9. 1721.

A · Piece · of · Roman · Building Called the Chair.



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Be this as it may, England was still covered with Roman ruins until the middle of the twelfth century, when the Church interfered and broke the spell that kept the unlettered people aloof. The monks and abbots then began to use the Roman ruins extensively as building materials whenever a monastery or a church was built in the neighbourhood. "The abbots of St. Alban's," says Matthew Paris, "built their Abbey from the bricks and stones of the Roman city of Verulamium." "So, too," says Mr. Thomas Wright, "the ancient city of Wroxeter was probably one of the great quarries from which the builders of Haughmond Abbey were supplied; and the churches of Wroxeter and Atcham, the adjoining parish, bear evidence of the same appropriation." It was the same elsewhere. It is very probable that the stones for Credenhill church came from Magna as they certainly did for many of the walls in the village and farm buildings around.

The Romans found Herefordshire a wide waste of uncultivated forest. Its steep wooded hills, its narrow sequestered valleys, and its numerous streams with their boggy margins, afforded an admirable means of defence to the active and fierce Silurians who occupied them. For very many years after the fall of Caractacus, his successors remained bitterly hostile to the Romans, and could only be held in subjection by the constant presence of Roman soldiers. The military stations throughout the county must therefore have been numerous, and yet so completely have they disappeared that it was not until the last century that any real knowledge was obtained as to their sites. The great Roman military centre "Magnis" of Antonine, was thought to be Old Radnor, at Gaer near Brecon, and at other places. The true site, now well known, was even supposed to be Ariconium, whilst others placed Ariconium at Cirencester, or on the "Ine" brook near Hereford, and so on. The only historical authorities for British localities in Roman times are the *Geographical Survey* of Ptolemy, which gives the names of the towns of the native tribes (*Monumenta Historiæ Britannicæ*, pp. 10 to 15), and the *Itinerary of Antonine*, which gives the Roman roads and towns (Ibid, pp. 20-22). These are believed to have been written about A.D. 120 but in both of them most of the sites of the places named are now unknown.

The Itinerary of Antonine consists of fifteen journeys made by him in different parts of England at this period, so early that many Roman cities are not even named in it, and the sites of the great majority of those which are named in it cannot now be recognised. Seven of these journeys were made in the Province of Britannia Secunda, which comprised all Wales and the district westward of the river Severn. The details of these seven journeys are well given in a paper read by Mr. James Davies at the Hereford meeting of the British Archæological Association in 1870, and which was afterwards published in the journal of the Society.

MAGNA CASTRA.

The Roman towns and stations in Herefordshire are as yet but very imperfectly known. The fortified town of MAGNA CASTRA was the most important of them all. In the first years of the Roman occupation, the strength of the great Camp on the hill, Credenhill Camp, gave security to the military station; but

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when the town was built in the valley below, nearly a mile from it, surrounded by a strong wall enclosing a space of twenty-one acres, it also became a fortified camp, and as the residence of all the leading Roman official officers, military and civil, it soon threw the camp on the hill into the background. The Romans have not left us their name for either camp, since the names of "Credenhill" and "Kenchester" are clearly of a later period. The twelfth journey of Antonine, called by Sir Richard Colt Hoare "Via Orientalis," establishes beyond question the site of the two camps. Antonine gives the distances thus:—From Caerleon (Iscâ Silurum) to Usk, nine miles; from Usk (Burrio) to Abergavenny, 12 miles; from Abergavenny (Gobannio) to Kenchester, 22 miles; from Kenchester (Magnis) to Bravinium, 24 miles; and from thence (Bravinio) to Wroxeter (Uriconium), 27 miles. The Roman mile has been determined by Dr. Black to be 5,000 English feet, or, within a fraction, nineteen-twentieths of an English mile (which is 5,280 feet). It is remarkable that in the text this military station is alone mentioned in the ablative plural. Dr. Black thought "Magnis" might therefore include the camps of Sutton Walls, or Dinedor, but it seems more reasonable to suppose that Antonine referred to the two camps here—the town camp, which was the Castra Hiberna or winter camp, and the far larger camp on the hill, Castra Æstiva, or summer camp. It was not until the last century, when the attention of antiquaries began to be directed to the relics of Roman occupation, that the name "Magna Castra" was given to the site of the Roman town to distinguish it from the village of Kenchester, which had taken the previous name of the town.

Dr. Black, the great authority on Roman works in England, stated that he believed Magna Castra occupied the most important position in the geometrical system of the Roman survey, or mensuration of the country, in the district. From this centre the roads were made, and the census taken, which were the two necessary preliminaries for the exaction of the land tax and the poll tax, and these two were the main burdens of Rome's fiscal system. Thus this town became the centre also of the civil administration of the district, and was occupied not only by the military staff and engineers, but also by the financial officers, and they, with the wives and dependents of many of them, would thus form a distinct Roman society with their own Roman manners, Roman customs, and the Latin language.

The site of Kenchester or Magna Castra has never been lost, though it has not always been recognised. The first report we have of this great Roman station in more modern times, is from the pen of John Leland, the chaplain, librarian, and antiquarian of Henry VIII. He spent six years most laboriously in travelling to collect materials for the *History and Antiquities of England and Wales*, and visited Herefordshire about 1550. He says, "Kenchestre standeth about iii myles or more above Hereford, upward on the same side of the ryver that Hereford doth; yet is yt almost a myle fro the ripe of Wy. This towne is far more auncyent than Hereford, and was celebrated yn the Romaynes tyme, and appeareth by many thynges, and especyally by antique mony of the Cæsars, viz., often found withyn the towne, and in plowghyng abowt; the which the people ther cawld dwarfes mony. The cumpace of Kenchestre hath bene by estimation as much as

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Hereford, excepting the castel, the which at Hereford is very spatiose. Peaces of the walles and turrets yet appere, *prope fundamenta*, and more should have appered, if the people of Hereford towne, and other therebowt had not yn tymes paste pulled downe muche and pyked out of the best for their buyldinges. Of late one Mr Brainton, buylding a place at Stratton, a myle from Kenchestre, did fetch much tayled stone there towards his buyldinges. . . . . By lykelyhood men of old tyme went by Kenchestre to Hay and so to Brecnoe and Cair Mardyn. The place wher the towne was ys al overgrowen with brambles, hasylles and lyke shrubbes. Neverthelesse, here and there yet appear ruines of buyldinges, of the which the folische people cawled one the King of Fayres chayre. Ther hath been fownd *nostra memoria lateres Britannici; et ex eisdem canales, aquæductus, tesselata pavimenta, fragmentum catenulæ aureæ, calcar ex argento*, byside other strawnge thinges. To be short, of the decaye of Kenchestre Hereford rose and florishyd." (Vol. vii., p. 152.) He adds also, "At Kenchestre was a palays of Offa, as sum say, the ruines yet remaine and vaults also. Sir John Lyngain was owner of the grownd, and now his heir." Offa's palace was at "Sutton Walls," and so Leland was right in attributing the latter statement to mere rumour.

Camden (1610) says of Kenchester that the town was an irregular hexagon, the south-west and south sides being the boldest; the ground being higher than the surrounding lands, but without fosse or ditch. Nothing remains of its splendour except not far from the east end, a piece of what was probably a temple, with a niche, which was five feet high, and three broad within, built of Roman brick, rough stones, and indissoluble mortar, and called "the chair." Foundations and holes as of vaults are scattered round it.

Dr. Stukely (1722) gives a ground plan of Kenchester—which he thought to be Ariconium—and thus describes it:—"The site is a gentle eminence of a squarish form, the earth black and rich, overgrown with brambles and oaks, full of stone foundations and cavities, where many coins have been found." (*Itin. Cur.*, i., 66.) Dr. Stukely represents "the chair" on his plan architecturally overdrawn, and it has also been depicted in one of the landscape views in Britton and Brayley's *Beauties of England and Wales*. These gentlemen say of it:—"Towards the east end is a massive fragment remaining of what is supposed to have been a Roman Temple. It consists of a large mass of cement, of almost indissoluble texture, in which are imbedded rough stones irregularly intermixed with others that have been squared. This fragment is called 'the chair' from a niche which is yet perfect. The arch is principally constructed with Roman bricks, and over it are three layers of the same material, exposed lengthwise. Here (in 1669) a tesselated pavement and stone floor were discovered."

In the succeeding year, 1670, Mr. Aubrey, in his manuscript notes, says old Roman buildings of brick were discovered upon which oaks grew. The bricks were of two sorts, some equilateral, seven or eight inches square and one inch thick, and some two feet square and three inches thick. About the same time a great vault was opened with a tesselated pavement, and Sir John Hoskyns also found an hypocaust about seven feet square, the leaden pipes entire; some made

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of brick, being a foot long and three inches square, let artificially into one another. Colonel Dantsey found burnt wheat in one hollow place, and sent some of it to the Society of Antiquaries in London. Camden adds that "numbers of coins, bricks, leaden pipes, urns, and large bones have been formerly dug up here."

This "chair," it may be stated here, was at one time called "Becket's Chair," from a legend that "Thomas à Becket often visited a pool in the parish of Sugwas by the road side, abounding in trout." There is much doubt whether Becket ever came into Herefordshire, but his memory was evidently much respected in this county. The old Roman road certainly passed by Sugwas pool, though it has long since been altered. This pool has also another tradition attached to it. It is supposed to occupy the site of an ancient city, which was destroyed and submerged by an earthquake. The pool as we now see it is little more than a marsh, and it seems just possible that the tradition may only have become inverted, and that the clay for the bricks to build the Roman city came out of the place and formed the pool.

Baxter, in his *Glossarium Antiquitatum Britannicarum* (1733), places Magna at Wall Hills near Ledbury, but as is now well known very erroneously.

There is no record to be found as to the time when the ruined walls above ground were taken away, and the site levelled for cultivation. It was probably a gradual work extended over many years, but it is within the memory of old men that many portions of the walls, covered with brushwood, existed above ground over a considerable part of the area. "In the second decade of the present century," says Mr. Hardwick (*Archæological Journal*, Vol. xiv., p. 83) "the site, which was a complete wilderness of decaying walls and *débris*, was cleared." Mr. Hardwick adds "The stones having been removed from the surface as deep as the plough penetrates, very good crops of corn are now raised. The land is loose and friable, and as fine as a garden. In the drought of summer, the lines of the streets and foundations of houses are quite visible in the verdure. The principal street runs in a direct line through the town from east to west, and was twelve or fifteen feet in width, with a gutter along the centre to carry off refuse water, as is traceable by the difference in the growth of crops. The streets appear to have been gravelled. No doubt many of the buildings were of timber, for along the lines of streets, at regular distances, the plinths in which the timbers were inserted, have been taken out, the holes being cut about four inches square, the plinths measured two feet in each direction, and lay two feet beneath the present surface." The exterior walls, however, certainly remained until a much later period.

"The only trace of exposed Roman walls that my fifty years' knowledge can recall," says Mr. J. J. Reynolds, "was removed by my uncle, Mr. John Hardwick, about the year 1861, when the fences were thrown down. It then formed a raised fence with scrub growing about it. It occupied a small portion of the north side, and carried the Kenchester footpath. Not a ploughing season passed in those days without a share or two being broken against some buried stonework."

When the site was first cultivated, and for some years afterwards, a great

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number of Roman remains were turned up by the plough. Mr. Hardwick soon obtained a large collection of coins, though they were almost all of small brass. No specimen of gold coin is known to have been found, and very few of silver. A small but very perfect silver coin still remains in the collection of the late Mr. Hardwick, with the bust of the Emperor Nerva (A.D. 96-98). Many with the effigies of the Menapian pirate, the British usurper Carausius (A.D. 287-293), Allectus (A.D. 294-296), and Constantine (A.D. 306-337). Several of them had on the reverse the children sucking the wolf, illustrating how the Romans at that late period of their history preserved the annals of their past on their national coinage, a point, by the way, in which the English have been grossly negligent. The absence of gold and silver coins is what would be the result of a deliberate military evacuation, followed by plunder of the natives in after years. Mr. Hardwick also found some curious little rudely made bronzes of a stag, a mouse, a lion, and a cock, varying in size from an inch to an inch and a half. The three latter have been figured by Mr. Thomas Wright, in their real size, in his *Wanderings of an Antiquary* (p. 33). He figures also a small bronze chopper, or cultrum, and he believed them to have been simply children's toys, although it had been the fashion to call them *ex votos*, or votive offerings. In Mr. Hardwick's collection also were several finger rings, an imperfect brooch, a bronze open-work knife handle, in the form of a running greyhound-like dog, keys, pins, beads, &c. He had also many flat circular stones, or querns, used by the women for grinding corn by hand, from 12 to 18 inches in diameter, with a hole in the upper stone more or less imperfect, some curious fragments of pottery and glass, a bowl of finely-glazed pottery work with cameo ornamentation, &c. Mr. Hardwick gave away, unfortunately, many of the most interesting objects of his collection to Dean Merewether, Mr. Roach Smith, and to many other enthusiastic antiquarians, and thus they have been scattered abroad to enrich private collections and are lost to the county.

In the years 1840-41 and 42 the late Dean Merewether, with the consent of Mr. John Hardwick, the proprietor, made a partial exploration of the site. A street was traced out by the remaining foundations of the walls on either side. The walls were found from one to three feet below the surface. These were about two feet wide and five or six feet deep. The base of a suite of rooms and passages which must have formed a house of no mean order, was laid bare. There were tracings of decorations on the walls, tesselated pavements, and beneath was a hypocaust for warming the apartments by hot air. The Mosaic patterns of the pavements were marked by tesserae, from three-eighths to half an inch square, whose prevailing colours were red, blue, and white. One pavement in scroll pattern, measuring thirteen feet by two feet, was found in a fair state of preservation. It seemed to form the floor border in a large room, and a portion of the plastering on the side walls presented still a beautiful red colouring. There were also devices of sea-horses and fish on the pavement patterns in an imperfect state of preservation. Three portions of these pavements were removed and the tesserae re-set in plaster of Paris, for the Museum of the Philosophical and Antiquarian Society, and they are at the present time in the Museum at the Library.

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A very perfect quern, or two flat circular stones for grinding corn by hand, was also found, and both the stones, 14 inches in diameter, with a wooden feeder which the Dean had made to show more clearly the exact mode of using it, are also to be seen in the Museum at the Free Library.

I was taken myself, in 1842, by Mr. Richard Johnson, late Town Clerk of Hereford, to visit the exploration, and was present when he found the very interesting Roman oculist's stamp which was afterwards figured and described in the *Transactions of the British Archæological Association*, by Mr. Roach Smith. We found, also, the same day, a bronze fibula, a considerable number of bone pins, like knitting needles, and the ground was strewn with *tesseræ* and broken pottery. The quantity of cinders, ashes, and blackened bricks and stones was very remarkable, and so like an ashpit as to justify the remark of a labourer who was looking on with amazed wonder at our diligent search, "Why you be got on a miskin."

Some portions of the foundations of the wall on the north-eastern side remained at this time. It carried the footpath as described by Mr. Reynolds, and was faced, where the facing existed, with stones, arranged zigzag—herring-bone fashion—in a rubbly mortar, which was not so hard and good as Roman mortar is generally found to be, a fact that favours the suppositon that it was built early and quickly of such materials as came to hand. Brambles and weeds grew in it luxuriantly.

The sites of the gates of this town corresponded very nearly with the cardinal points. They are not now visible, but they are given in Dr. Stukely's plan.

The only inscriptions we found at Magna are on the Roman oculist's stamp before alluded to, and a milestone. "The small square pieces of stone," says Mr. Thompson Watkins, in his excellent paper, "Roman Herefordshire" (*Archæological Journal*, Vol. xxxiv. pp. 349-372), "is one of the well known medicine stamps of the Roman oculists." It is inscribed on all four side as follows :

(1)	(2)
T. VINDAC . ARIO	T. VINDACIAR
VISTI ANICET	OVISTI NARD
(3)	(4)
* VINDAC ARI	T. VINDACARIO
OVISTI CHLORON	VISTI*******

The asterisks mark missing letters. On the upper surface of the stone is inscribed

SENIOR

on the lower side

SEN.

the latter doubtless the abbreviation of the former, both being probably made subsequently to the larger inscription, and referring to the owner's name. All four of the sides, it will be seen, bear the words, T. VINDACI ARIOVISTI; to the first is added the name of the medicine, ANICET(VM); to the second another medicine, NARD(VM); to the third the name of the medicine, CHLORON; whilst in the fourth the name of the medicine has been obliterated. The English translation simply is that they are the *Anicetum*, *Nardum*, and the *Chloron* of *Titus Vindacius Ariovistus*. The latter name, "Ariovistus," is German.

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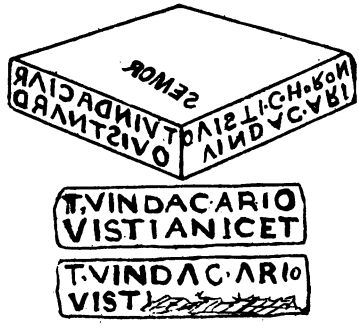
Woolhope·Trans·
1882.

Roman Medicine Stamp.

Found at Magna Castra. in 1842.

1. T·VINDAC·ARIO VISTIANICET
2. T·VINDACIAR OVISTI·NARD
3. ·VINDAC·ARI OVISTICHLORON
4. T·VINDACARIO VISTI.....



R·CLARKE.
DEL.

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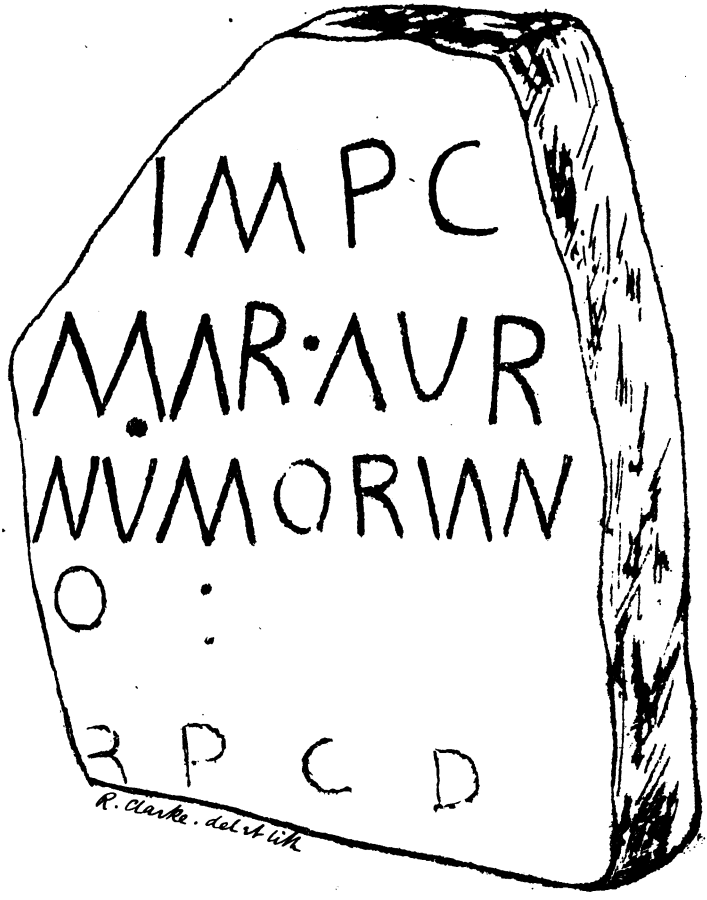
Woolhope · Trans · P. 2

Hereford · Museum



Milliarium

or Roman Milestone $\frac{1}{6}$ size

Emperor · Numerianus. A·D·282

Found at Magna Castra. A·D·1795.

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The other inscribed stone, a *miliarium*, or milestone, was found in 1796, in the foundations of the north wall of the town. It is inscribed to the Emperor Marcus Aurelius Numerianus, who reigned A.D. 283-284, and it is the only inscription to this Emperor found in Britain, and they are very rare on the Continent. The reign of this unfortunate prince was so short, that it is not extraordinary that so few inscriptions relating to him should remain. There is not one in Horsley's *Britannia Romana*, and only two in Gruter's *Collection*, both found in Spain, and both with the addition of "nobilissimus Cæsar." He was associated with his father, Caius, and his brother Carinus, in the empire, A.D. 283-284, and died in the year 284. In one of the Spanish inscriptions all three names are given. Vobiscus gives a very high character to Numerianus for his virtues and talents, and it is reasonable to suppose that the army would readily embrace any opportunity of rendering him honour, especially in a branch of the empire which was more particularly under the government of his brother Carinus. (See *Archæologia*, Vol. xv.—Appendix, plate xxvii., fig. 2.) The inscription, as given by Mr. Lysons in the *Archæologia*, Vol. xv., p. 391, Appendix, on plate 27, fig. 2, is as follows :—

IMP. C
MAR. AVR
NVMERIAN
O
R. P. C. D.

The first four lines plainly read *Imp(eratore) C(aio) Mar(co) Aur(elio) Numeriano*, but the last four letters which were very imperfect when the stones were first found, are now (1882) quite obliterated. The meaning of these letters has been much discussed. "Professor Hübner," says Mr. Thompson Watkins, "suggests that the letters may be PFAVG. As the letters RP are found in an inscription at Caermarthen, standing for *Reipublicæ*, I think it probable that BONO has been obliterated from the fourth line, and that the fifth has been originally R.P. NATO. This miliary is now in the Museum at Hereford," and the Rev. Prebendary Scarth, in his exhaustive paper on "Roman Miliaries," (*Archæological Journal*, Vol. xxxiv., pp. 395-405) states that a miliary with this same inscription was found at Uriconium (Wroxeter), and is preserved in the Museum at Shrewsbury.

This miliary was in the possession of the Rev. C. J. Bird at the beginning of this century, and was presented by his son-in-law, the Rev. R. L. Brown, to the Museum at the Free Library in 1880, where it is now carefully preserved. It has been figured in the *Archæologia Cambrensis*.

The Roman altar which was found in St. John Street, Hereford, and described in our Club *Transactions* was removed, without doubt, from Magna. It is a monolith, in good preservation. It stands 3ft. 4½in. high, 1ft. 5½in. broad, and 1ft. deep. It now stands on the stair-case at the Free Library. There are traces still of an inscription upon it. The Rev. Prebendary Scarth thought he could trace the letters

* * NIIV

and suggested the word "Minerva."

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A small domestic Roman altar was found some years since in the moat of the Castle Green, at Hereford, which was also probably brought from Magna. It consists of a single stone, the corners being carved into plain round columns, with simple mouldings above and below. The stone is very heavy and seems to be a sandstone conglomerate. It stands 17in. high, and is 7in. broad by 5in. deep. The small columns in strong relief are 9in. high, and those in front would seem to have been polished. Above the columns in front, and at the sides, are the remains of a floriated wreath. It is without an inscription. This altar has also been presented by Mr. Cam to the Hereford Museum, where it is now to be seen.

One other Roman altar has been found in the county. About the year 1837 it was discovered by Mr. Charles Bailey, F.S.A., at Tretire; it had been cut into the shape of a font, and was used as a font in the parish church for many years. It is over 29in. in height, by 16in. in breadth, and contains the remains of an inscription as follows:—

DEO TRIVII.
BELLICVS. DON
AVIT ARAM.

Modern Antiquaries (including Professor Hübner, of Berlin) read this inscription as *Deo Trivii Bellicus donavit aram*—"To the God of the three ways Bellicus gave this altar;" and no doubt three ways or roads converged on the spot where the altar was first set up. Mr. Thomas Wright, however, with Mr. Thompson Watkins, and Dr. McCaul, have expressed some doubt as to whether it might not be an early Christian inscription reading DEO TRIVI; but, at the same time, Mr. Watkins states "that it is scarcely probable that any Christian in that period would erect an altar 'to the Triune God.'" This altar* remains at this time in the vestry of the church at Tretire.

In the church of Kenchester, to this day, a portion of a Roman pillar hollowed out at the upper end, serves as the font. Mr. Thompson Watkins states that Mr. Soden Smith exhibited at the Institute, on December 4th, 1874, a Roman bronze ring, with an original *intaglio* on glass plate, in imitation of niccolo onyx, from Magna; and, also, that in 1829 a small bronze image of Hermes was found in excavating ground in the city of Hereford, which was probably a Lar.

The Hereford museum also contains a fibula, some pottery, and a Roman brick taken from the bed of the river Wye, near the weir, by the Rev. H. Cooper Key. The Roman road from Kenchester crossed the river here, in a direct line with the Stony Street road which goes through Madley. Some portions of the stone abutments of the Roman bridge still remain, and in the bed of the river below there is still a quantity of worked stones to be found.

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*The late Rev. T. W. Webb wrote (1883) to Mr. H. C. Moore:—"The Roman Altar was found by my father the Rev. John Webb, Rector of the parish of Tretire with Michaelchurch, at Michaelchurch,—I cannot recollect when, but probably anterior to 1837. The upper part, which had never been supposed to be a font, was standing at a cottage door near the Church, and was employed by the village Doctress for pounding her herbs. The lower part was found inside the W. end of the Church. No one knew where either portion came from. The fact that it had never been used as a font is sufficiently apparent from the great antiquity of the massive old font in the Church of Michaelchurch, which bears a Norman, or possibly Saxon, ornament, of the rudest character."

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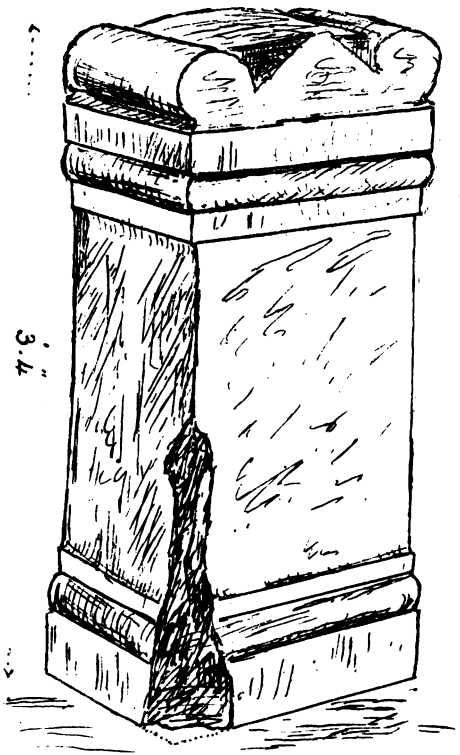

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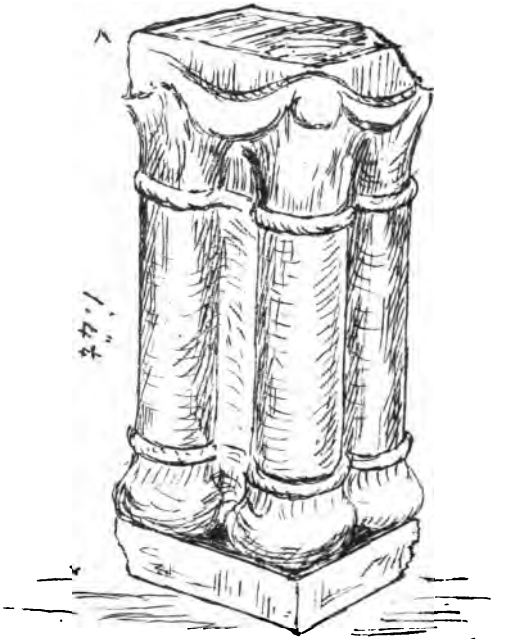

Hereford · Museum

Portable altar

Roman Altars

Woolhope. Trans.
1882

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It only remains, in conclusion, to state that the site of the ancient city is still well defined. It lies about two hundred yards south-west of the present Creden hill railway station, and is still called "The Walls." Standing on the railway bridge, the line of the fortifications or boundary wall which enclosed the town, can be traced on the eastern side by the rising undulations of the ground, the site itself being from four to six feet higher than the ground below. The site of the old town rises considerably towards the south and the west. Two trees stand singly about the middle of the area—an oak, which is becoming a fine tree, and a lime-tree—and their roots luxuriate among the remains below. Notwithstanding the lapse of twelve centuries, the dark soil, almost black in places, contrasts in the most marked manner with the ordinary red soil of the field now joined to it, thus confirming the tradition that the place was burnt. The Kenchester footpath starts from the bridge, and crosses a portion of the area. From the high ground on the western side, or from the stile at the far corner, the course of the main street may be traced in the varying growth of the crops, particularly in spring and autumn. The corn springs up quickly over the stones, but grows poorly and ripens prematurely, whilst where the soil is deeper, in the centre of the way, the corn, if it springs up more slowly, grows with greater vigour and fertility. The plough still strikes the stones beneath so frequently as to require care. Fragments of that imperishable article, coarse pottery, may still be found by all who look for them, and sharp eyes may be rewarded, perhaps, by specimens of *tesseræ*, but coins have become very scarce and difficult to find.

There can be no doubt, however, that an exploration three or four feet deep in any part of the area within the walls would produce an abundance of objects of interest, and rejoice the heart of an antiquarian.

A special compartment in one of the large glass cases in the Museum has now been set aside for the reception of Roman remains found in Herefordshire, and any donations will be thankfully received and be very carefully preserved.

ARICONIUM.

This Roman station was second only in importance to Magna in Herefordshire. It is mentioned in the thirteenth iter of Antonine, and is there stated to be fifteen miles from Glevum (Gloucester) and twelve from Blestium (Monmouth). It possessed extensive smelting furnaces and forges, as shown by the many floors discovered, and the abundance of iron scoriæ to be found there. It may be called the Merthyr Tydvil of the Romans, and was probably also the centre of the numerous ironworks whose remains are discovered in South Herefordshire and the adjoining districts. Its very site was unknown until the beginning of last century, when the celebrated antiquary, John Horsley (who died in 1731) in his work, *Britannia Romana*, was the first to determine that Ariconium must have stood somewhere near Ross. It is now proved beyond doubt to have been seated at Bollitree, in the parish of Weston-under-Penyard, three miles from Ross. Up to the middle of last century (c. 1750) an extensive thicket of briars and brushwood covered and hid from view the broken walls and rubbish of Ariconium. Towards

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the end of the century a Mr. Meyrick, the proprietor of the estate, determined to stub up the bushes and clear the grounds. At that time there were portions of the walls of houses standing above ground, and quantities of antiquities of all sorts were found: vaulted chambers, sometimes containing wheat black as if charred with fire; tesselated pavements, bronze statuettes, fragments of pottery and coins, with scoriæ, cinders, and ashes, in abundance.

In Britton and Brayley's *Beauties of England and Wales* (V. vi., p. 514) it is stated there was found there "an immense quantity of Roman coins and some British. Among the antiquities were fibulæ, lares, lachrymatories, lamps, rings and fragments of tesselated pavements. Some pillars were also discovered with stones having holes for the jambs of the doors, and a vault or two in which was earth of a black colour and in a cinerous state . . . Innumerable pieces of grey and red pottery lie scattered over the whole tract (1805), some of them of patterns by no means inelegant . . . . Some of the large stones found among the ruins of the station, and which appear to have been used in building, display strong marks of fire. During the course of last summer (1804) in widening a road that crosses the land, several skeletons were discovered; and also the remains of a stone wall, apparently the front of a building; the stones were well worked and of considerable size." The same writer also states that the "coins which were chiefly of the Lower Empire were of gold, silver, and copper."

The British Archæological Society visited the site in 1870 (see Journal, Vol. xxvii., pp. 203—18). The coins then exhibited by Mr. Palmer consisted of one gold, six silver and two copper British coins, some of them of Cunobelin; one hundred and eighteen silver, billon, and brass Roman coins, ranging from Claudius, A.D. 41, to Magnentius, A.D. 350—3; twenty fibulæ of bronze, a silver ring, six bronze rings, bronze keys, pins and nails, four *intagli* (two of them cornelian), glass beads of various colours, bronze buckles, and other bronze instruments.

In the *Archæologia* (Vol. ix., Appendix, p. 368,) a figure of Diana is described, which is also said to have been found at Ariconium.

Mr. Thomas Wright spent some time there to make enquiries. He says "Local tradition states that the town was beaten down and all the people killed;" that the field of the site is called "Bury Hill," or "Rose Hill," and some think the stones built Ross; that the name of the house and estate of "Bollitree" is vulgularly believed to be derived from its being built on the belly of the town; and that the field sloping down from the site is called "Killground Meadow," from the blood of the people killed there. The gentle slope of the ground on the western side of the site towards Weston-under-Penyard is called "Cinder Hill," and the surface has only to be turned up at this time to show that it consists of an immense mass of iron *scoriæ*. A farm close by is called "Aske Farm," probably from the abundance of ashes and cinders found there.

The site at the present time (1882) presents a blackened soil extending over an area of nearly one hundred acres. It is cultivated as arable land, and still yields Roman remains to every visitor who will look for them.

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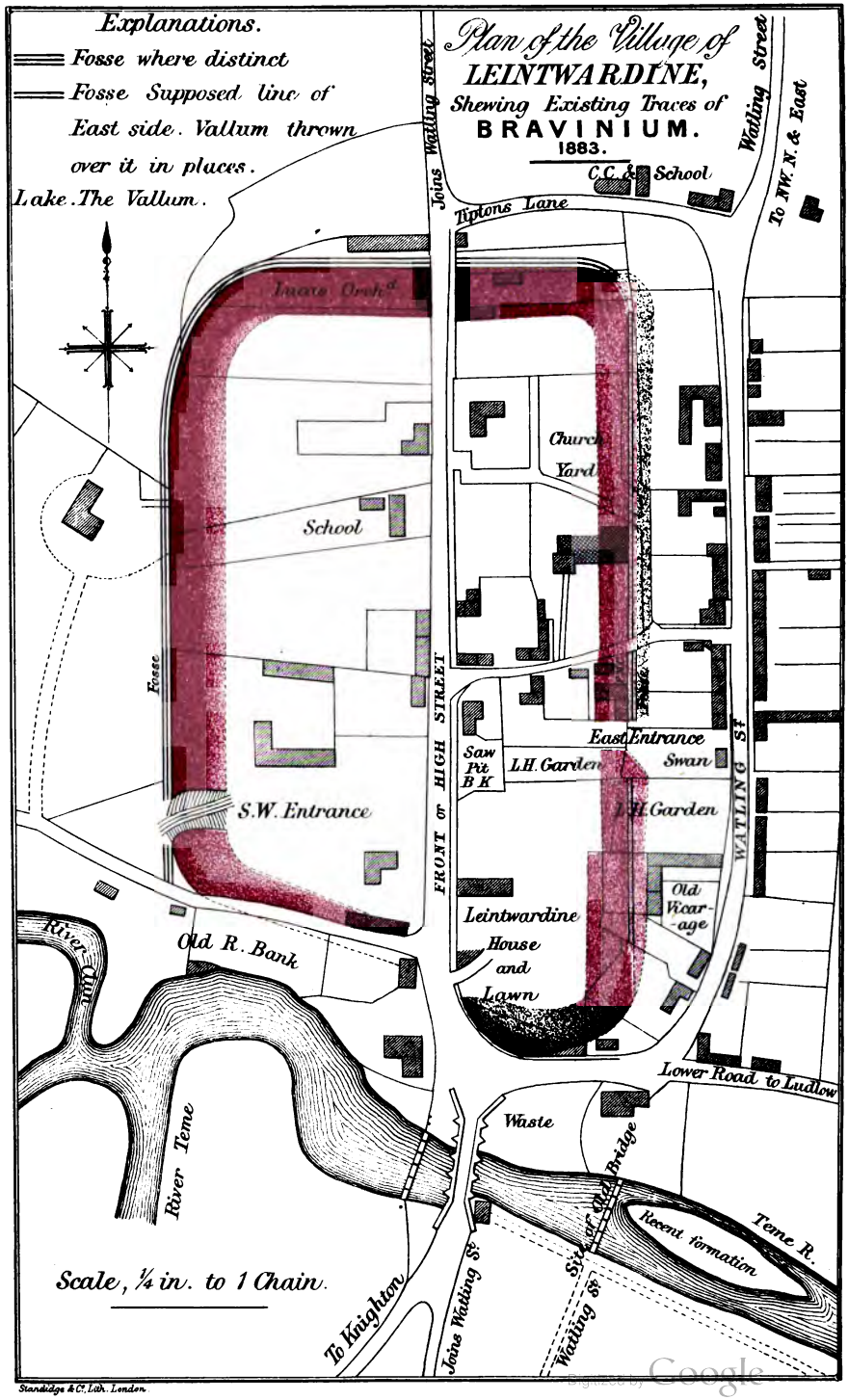
Explanations.
Fosse where distinct
Fosse Supposed line of East side. Vallum thrown over it in places.
Lake. The Vallum.
Plan of the Village of
LEINTWARDINE,
Shewing Existing Traces of
BRAVINIUM.
1883.
Joins Watling Street
Watling Street
To NW. N. & East
C.C. & School
Tiptons Lane
Inner Orch.d
Church Yard
School
Fosse
FRONT or HIGH STREET
East Entrance
Saw Pit B K
L.H. Garden
Swan
S.W. Entrance
L.H. Garden
WATLING ST.
Old Vicar-age
Leintwardine House and Lawn
River Clun
Old R. Bank
River Teme
Lower Road to Ludlow
Waste
Site of Old Bridge
Recent formation
Teme R.
Scale, ¼ in. to 1 Chain.
To Knighton
Joins Watling St.
Watling St.
Standidge & Cº. Lith. London.

BRAVINIUM.

The site of the Roman station intermediate between Magna and Uriconium has been much discussed by antiquaries. It is named by Antonine, Bravinium, or Bravonium, and by Ptolemy Brannogenium. In the twelfth section of the British Iter of Antonine its relative position is placed as at 24 miles from Magna, and 27 miles from Uriconium, and since it must have been situated on the Roman road, now called Watling street, between these towns; and since, moreover, the Roman mile was, within a fraction, one twentieth less than our present English mile, its position could scarcely have been more definitely fixed. The existence, however, of the strongly entrenched camp of Brandon within a couple of miles of the position assigned to Bravinium, and the seeming absence of any other fortified station near, appears to have attracted the attention of observers and to have checked a more exact search. Mr. Hartshorne, in his *Salopia Antiqua*, considered Brandon Camp as identical with Bravinium (S.A. p. 58). Mr. James Davies, of Hereford (*Archæologia Cambrensis*, Vol. v. N.S. p. 100) also thought so, but suggested further inquiries. Britton, Camden, Aubrey, and others seem also to have considered them identical. The situation of Brandon, however, does not correspond with the position Bravinium should occupy according to Antonine, whose distances are generally accurate; and it is a fact that Roman remains have never been found at Brandon; neither ashes, fragments of tiles or pottery, nor even one single Roman coin; although the inner area has long been cultivated. These circumstances have puzzled thoughtful antiquaries, and made them look elsewhere for the true Roman station. Horsley placed Bravinium "at Ludlow or Rusberry, between Wenlock and Church Stretton." Williams, in his *History of Radnorshire*, fixes Bravinium at Blackwardine, two miles south of Leominster (which beyond doubt was a Roman station, though its Roman name has been lost). The German geographer Mannert placed Bravinium at Bromfield, and in a note on this by Mr. Thomas Wright in his *History of Ludlow*, p. 3, he says, "I am strongly inclined to believe that the present race-course adjacent to Bromfield, which bears the name of 'Oldfield,' and around which there are several tumuli, was the site of a Roman settlement of some kind." Mr. W. Thompson Watkins, *Archæological Journal*, Vol. xxxiv., 1877, states that the key to the solution of the site of this station (Bravinium) would appear to have been originally given by the Rev. J. Pointer, M.A., of Merton College, Oxford in his *Britannia Romana*, published at Oxford, 1724; when treating of the Roman camps in the various counties of England, he says, at p. 54, "Herefordshire: In *Dindar* parish near Hereford is a camp called *Oyster Hill;* another at *Lanterdin* between this county and Shropshire; another at Ledbury." Mr. Longueville Jones, in his map *Britannia Secunda*, has also happily assigned Leintwardine as the site of Bravinium. Mr. Thos. Wright states that "it was probably situated in the immediate neighbourhood of Ludlow, perhaps at or near Leintwardine" (p. 3), but he adds also (p. 6) "the last traces of Bravinium have long disappeared."

These remarks were written in 1852, and at this very time Mr. Hugh Thomas

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Evans, of Leintwardine, had begun his observations, which ended in the rediscovery of the entrenchments of Leintwardine. From time to time in local papers, as in the *Ludlow Advertiser* and *Hereford Times*, notices were given of the Roman remains found there. It was not, however, until the Cambrian Archæological Society visited Leintwardine in 1874, under the guidance of Mr. R. W. Banks, that the question was settled. Mr. Hugh Thos. Evans, the churchwarden, pointed out the remarkable vallum to the scientific visitors, and exhibited to them the Roman remains he had collected. Mr. Banks afterwards published a detailed description of these discoveries in the *Archæologia Cambrensis*, Vol. v. (4th series, pp. 163-5) and the visit of the society—the vivid impression produced by the actual inspection of the earthworks—followed by the publication of Mr. Banks's paper, convinced all antiquaries that the true Roman station of Bravinium existed there.

The village of Leintwardine is situated on the northern bank of the river Teme at its junction with the river Clun. It occupies rising ground, with a pleasant southern aspect. The high road, called Front Street, or High Street, passes up through the centre of the village, and from the road near the river, to the end of Tipton's Lane at the top, rises 56 feet, by an ascent made gradual and regular. This improvement places the road at a lower level than the adjoining ground, and since the embankments, about to be described, are behind the houses and gardens which front the road on either side, they are concealed from ordinary observation. A second road—the Roman Road—called East Street on old deeds, but since named Watling Street, runs parallel with Front Street, but is outside the eastern embankment. This has not been levelled, and rises 1 foot in 17 to a point opposite the Church, and 1 foot in 29 above it. These roads are joined by Church Street, which crosses over the eastern embankment below the Church, and here it is 20 feet higher than the road in Front Street, and 13 feet higher than the Watling Street Road—Front Street at this point being 27 feet above the lower level, and Watling Street 34 feet.

The entrenchments which enclosed the old Roman town are still plainly to be traced, except on the southern side, where considerable alterations have been since made. They are very massive, and, where most distinct, they present the extraordinary breadth of twenty yards. A width greater than that of the walls of Babylon, according to Pliny and Strabo, and approaching the estimate of Herodotus. They are still eight or nine feet above the level of the ground outside, from which it is very evident the earth has been taken to form them. These embankments form a parallelogram measuring 308 yards from north to south, and 220 yards from east to west, giving a space of about fourteen acres, including the embankments, or without them an inner area of about nine acres. The great breadth of the vallum is best seen at this time (1882) in Mr. Lucas's orchard at the north-western end, where it is very well marked; but it can be seen to have been equally broad throughout, though cultivation has sloped it off on the inner side. It is very distinct along the western side, and across the northern end, except where Front Street intervenes, and down the eastern side to the bottom, near the river. The chancel of the church is built on the embankment on this side, and a wall,

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running the length of the old churchyard and for some distance below it, supports the soil that elsewhere has been thrown east, so as to fill up partially the fosse; it is called the "Ditch Wall." The southern embankment is more difficult to trace out. It seems to have been made obliquely, from west to east, along the river front. It begins at an angle of about 100° from the west end, running in the direction of the embankment at the eastern corner. Then a large portion seems to have been removed to make Mill Lane and the buildings on each side of the entrance to the lane. The rest of the intervening ground beyond Front Street now forms the lawn of Leintwardine House, and it has been so much altered in making terraces and the carriage drive, that whilst these changes have left the eastern embankment still distinct, they have removed that on the south side, which should join its lower end. The earth, however, is still there, and the ground higher than it otherwise would be.

Two entrances may still be traced clearly. One which entered obliquely through the western embankment, just above its lower end, which may be called the western entrance; and the other a direct entrance on the eastern side, between the upper boundary wall of the Leintwardine House property, and the Primitive Methodist Chapel, below Church Street. This eastern entrance is more clearly proved, also, by the fact that up to 150 years ago the space, from the break in the embankment to the Watling Street Road, was unowned and unoccupied, and those who have now possession of it have no other title to it than that which length of occupation affords. It is very probable that there were also entrances north and south, at either end of the present Front Street, but this is purely conjectural.

The fosse, or outer line of the entrenchments, almost throughout the whole extent, still forms a division of property, and thus also curiously marks out to the present day the extent of the fortifications of the old Roman town.

It has long been observed by local builders and others, when sinking wells, digging foundations, or making cellars, that throughout the inner area, at a depth of from four to five feet below the surface, a stratum of ashes and burnt material is met with; and from one foot to eighteen inches below this again, a second stratum of ashes and charcoal is found. "Wherever graves have been dug in the churchyard, to the depth of eight feet," says Mr. Banks in his paper, "two layers of ashes and charcoal intermixed with tiles, broken pottery, bronze articles and coins, have been passed through. A few years since, on the restoration of the church (1865), a drain was cut through the eastern entrenchment, but no trace of the ashy layers was found outside the enclosure. The remains, from time to time found, were generally thrown away as rubbish, or dispersed, until Mr. Evans commenced his observations. Among the articles which he has secured are half of a stone hand mill, or quern, pierced with a hole; the upper part of an earthenware pounding mill with a lip or rim; fragments of Roman pottery; a bronze ring; and a third brass of Constantine the Great, with a square altar on the reverse. At the north-east corner of the enclosure, some grains of wheat in a charred state were found at the depth of a few feet, in excavating the foundations of a cottage; and on the south-west, fragments of thick brown pottery, apparently

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roof-tiles, were turned up. There can, therefore, be no doubt that this was a Roman station, occupied for a considerable period." He also adds: "I think we have sufficient data to say that it is the site of Bravinium," and in this opinion Mr. Thompson Watkins "fully concurs."

Mr. Banks thinks that "Brandon was probably the first station occupied by the Romans, and that the site of Leintwardine at the junction of the two rivers well supplied with fish, and commanding the two valleys from which the hostile Britons would emerge, was afterwards chosen as a better place for a permanent residence." Whether Brandon may have been first occupied, or whether it may have been a summer camp afterwards chosen, the better to observe and oppose the movements of the Britons on Coxwall Knoll (the opposite hill), would equally explain the absence there of any Roman remains. Brandon is half a mile from the nearest point of the Roman Road, and has no other supply of water than such as wells or rain might yield, and there is no trace existing now of either well or reservoir for water, and it would therefore afford far less convenience as a station than the site of Leintwardine. It may also be observed that Brandon Camp would form a refuge from any sudden attacks on the south side of the river, when floods rendered the stream impassable.

The existence of numerous tumuli in the immediate neighbourhood also indicates the surrounding locality as the scene of many a severe fight. At Walford, a short distance from Brandon, are two, and in one of these were discovered, Mr. Banks states, on February 8th, 1736, a yellow vase-like earthen vessel of Roman form with a beaded moulding around the swelling portion and at its base. It stood 18 inches high, the diameter at the mouth was six inches, at its widest part 14 inches, and at the base 12 inches. It was broken by the country people in the hope of finding money in it, but they found instead a mixture of bones and earth, human teeth, with a part of a skull and jawbones. "Roman coins," Mr. Hugh Evans also states, "have been found near Walford, and fragments of pottery in a field higher up the valley, where again the ground is blackened."

There can be very little doubt, therefore, that Roman Bravinium occupied the site of the present Leintwardine. It was burnt and destroyed. There were the burnt remains to prove it. The site, however, must have again begun to be occupied at an early period. In Saxon times the Hundred of Lenteurde extended into the three counties of Herefordshire, Shropshire, and Radnorshire, and the Manor belonged to King Edward the Confessor. It is most probable that its favourable position, added perhaps to political expediency, and the existence of well-made roads, caused the superstitious feeling prevailing at that time against the occupation of Roman towns to be quickly overcome. All the other Roman Stations in Herefordshire—Magna, Ariconium, Cicutio, and Blackwardine—were deserted from the time they were destroyed, and have never been re-occupied. A blackened soil alone remains to indicate their site to a superficial eye. Not a single human habitation is to be found on any one of them. The scenes, formerly so busy with active Roman life, are entirely deserted, except by the labourers, who come to prepare the soil and sow the seeds for the agricultural produce that annually covers the surface of the ground.

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The Club is much indebted to Mr. Hugh Thomas Evans for so readily pointing out the most interesting localities on the spot, and for imparting the information gained by many years of observation. To the Rev. W. D. Ingham, of Leintwardine, warm thanks are also due for the exact plan, drawn to scale, which he has so kindly prepared for this paper. It shows the extent and position of the entrenchments much more clearly than any verbal description could do. But after all, neither words nor plans can ever equal the impression produced by the actual inspection of such massive and interesting works. They must be seen and studied to be properly appreciated.

CICUTIO OR CIRCUTIO.

This Roman Station is not mentioned either by Ptolemy or Antonine. It is named, however, with five others by the anonymous geographer of Ravenna, in his *Chorography* as existing between Caerleon and Magna. Baxter in his *Glossarium Antiquitatum Britannicarum*, placed it at Stretton Grandison, and it appears here on all the old maps. The Roman road from Magna enters that from Bravinium and Blackwardine at a right angle, and tradition assigns its place in the south-west corner near the junction of the roads. Its exact site was not known, however, until it was accidentally discovered by Messrs. Stephen and Philip Ballard in 1842, when making the Ledbury and Hereford Canal. On the banks of the river Frome, in a flat meadow called "Budbury," about half-a-mile from the Camp on the hill, it was necessary to dig a square hole 60 feet by 40 feet, and 12 feet deep, in order to lay the foundation for the aqueduct to carry the canal over the river. The excavation was made in the open meadow, and the large arch forming the aqueduct was first built and the river slightly diverted from its channel was turned through it. Towards the bottom of the excavation black soil was met with containing a large number of bones of sheep and cattle and horses, particularly blade bones. On examining more closely, a pair of Roman weight scales (which would be the modern steelyards only they are made of copper) were found with the weight attached; a Roman coin of small brass; a couple of gold bracelets, one made of coiled gold wire, and the other a flat gold band with light scroll work upon it, each fastened with simple hooks; fragments of Samian ware with animals embossed in relief; and many pieces of coarse pottery. A round ball of stone, two inches in diameter, like a small cannon ball, was also found. Budbury meadow at the present time is extremely liable to be flooded by the muddy waters of the river Frome. It is below the Camp and to the west of it, near Canon Frome canal wharf.

The Camp on the hill is very extensive, and were it not for the trees upon it would command a wide view of the surrounding district. It does not at this time (1882) present any regular lines of fortification, and the "Square Camp," spoken of by most writers, is no longer apparent. On the south side, a long artificial escarpment leads up toward the Camp, and near the top of the hill a deep fosse takes its place. There are also signs of a ditch near the northern end of the Camp, and scattered all about it are a number of rough single stones, that do not seem to belong naturally to the situation. Its surface is covered with timber, and a clump

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of Scotch fir trees growing on a mound at the highest and most prominent part of the hill very possibly marks out the signal station of its Roman occupants.

On the south side of the hill in the wood near the top, is a large hollow space, from which very possibly the earth was taken to form the present road on the escarpment just mentioned. On the side of this hollow, Mr. Herbert Ballard, when digging ferns among the underwood, in 1878, discovered a very curious Roman lamp at a few inches below the surface.

BLACKWARDINE.

Another Roman Station of some importance was BLACKWARDINE. Tradition has long asserted that a fortified Roman town of considerable size existed here, and many coins, and fragments of pottery and other Roman relics had supported the belief. Its Roman name, however, is not known, and its site was not discovered until the year (1881), when the Leominster and Bromyard Railway men cut through a corner of it. At three or four feet below the surface they found many Roman remains, broken vases, pottery, portions of grinding stones, and other objects of interest. It is situated on a branch of the Roman road leading from Bravinium towards Wall Hills, and the pass over the Malvern Hills, at the foot of the Herefordshire Beacon. Cicutio was also situated on the same road. The site is on high ground in the parish of Stoke Prior, about a mile north of Risbury Camp. It was formerly a common, but has long since been enclosed. It is now arable land, with the black soil which denotes the mode of its destruction. Any exploration on this site could scarcely fail to produce objects of the highest interest.

EASTNOR OR CASTLE DITCH.

A small Roman Station probably existed here. The Rev. J. Pointer in his *Britannia Romana* (1724) speaks of "another (Camp) at Ledbury," and this has been generally supposed to have been at Wall Hills. The Romans doubtless used this Camp when it suited their purposes, as they did most of the Camps in the County, but though it has been cultivated for at least a century past, it has afforded but very slight evidence of Roman occupation. In 1876, when some excavations were being made on what is now the lawn tennis court of Eastnor Castle, some curious portions of stone piping were discovered. They are of Oolite stone, bored through the centre and fitting by socket into each other. They were evidently used for the conveyance of water, probably from the beautiful spring near the church, and the locality is close by the Ridgway and Wainstreet Roman Roads. Mr. George H. Piper has these pipes in his possession. The nearest place from which Oolite stone can be found is some twelve miles off, at Bredon Hill. The exact site of the station, which was probably very small, has not yet been discovered, nor is its Roman name known.

There were, doubtless, several other small stations scattered through the county to render the roads secure for travellers, as well as for the convenience of the Roman settlers.

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ROMAN VILLAS.

The remains of a Roman Villa were discovered at Bishopstone in the year 1812, by tha Rev. Adam John Walker. Mr. Walker was the Rector of the parish and had to build the parsonage house. He took much pains to fix on the site and at length decided upon a spot in the middle of a ploughed field, above the fog of the valley and commanding a good view. On digging the principal drain the workmen came upon a tesselated pavement, about 16 inches below the surface of the ground. It was very carefully uncovered, and found to be thirty feet square, of a very elegant and graceful design, and the colours seemed as bright as when first laid. The discovery created very great interest, and the country people were so impressed with the idea that some treasure was hidden beneath, that Mr. Walker was obliged to have a night watch to prevent it from being destroyed. The tesseræ were laid on a bed of clay with so thin a layer of cement that it could not be removed without breaking it up, and after a sketch had been taken it was re-covered. Mr. Thomas Bird, F.S.A., exhibited this drawing at the Society of Antiquaries (*Archæologia*, Vol. xxiii, p. 417). "At a distance of one to two hundred yards around this house," says Mr. Walker in a letter to Mr. Bird in the year 1830, "we have dug up on every side Roman bricks, pottery (both coarse and fine), and many fragments of funeral urns; and I am rather surprised that only three coins have yet been found (of Constantine). A regularly pitched causeway, or rather foundation, has been found repeatedly; and in June, 1821, in my kitchen garden, south-west of the house, a foundation of sandstone (which seems also at Kenchester to be the only stone the Romans employed) at the east end about three feet deep, and at the west end deepening to about five feet deep, were discovered. The foundation is full three feet wide, and increases towards the angle, where it turns, to five feet. I traced it fifty-five feet, parallel with the respective sides of the pavements; but there was no appearance of walls round the pavement. I found also a twenty inch foundation wall most strongly cemented, on the east side of the house. Considerable quantities of black earth, near the places where the fragments of urns have been found, were also discovered. Bones have likewise been collected at about the general depth of sixteen or eighteen inches." Mr. Walker also traced a causeway across two or three fields in the direction of Magna Castra.

The site is one mile and a half west of Magna, and about seven miles from Hereford. It commands a view, not only of the higher parts of Magna, but also of Credenhill Camp and of Dinedor Camp in the distance; and from the absence of any trace of hypocaust it is supposed to have been the summer residence of some general officer of Magna Castra, who seems, as was so often the case with builders of Roman country houses in Britain, to have been equally careful with the modern Rector in the selection of the site for his Villa.

At Credenhill, Roman remains have been frequently found in the intervening village, between Magna and the Camp, and in the cutting for the Hereford and Brecon Railway, quantities of coins, pottery, small vases, horse shoes and various other articles were found, and the Roman road running from Magna to Credenhill was cut through transversely about two feet below the surface of the ground (Mr.

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James Davies, *Hereford Times*, Aug. 17, 1867). It is highly probable many suburban buildings existed in this locality.

At Putley about five miles west of Ledbury, Mr. Thomas Blashill found, in digging the foundation of the north wall of the church, several Roman flue tiles, and flange tiles, with numerous bricks bearing upon them the marks of sandals, woven clothes, cats' feet and thumb marks, together with Roman pottery. He exhibited them at a Meeting of the Woolhope Club, March 9th, 1876, and afterwards at a Meeting of the British Archæological Association (see *Journal*, Vol. xxxii, p. 250). The following year Mr. Riley found, on his estate at Putley, a number of Roman wall tiles, roof tiles, and pottery, which confirm the suspicion that a Villa existed near that spot, but its exact site has not been found.

A Roman tesselated pavement was discovered at a place called "Cored Gravel" about half a mile from the Roman Camp at Walterstone, and two miles north of Old Castle, which probably implies the site of a Villa (*Archæologia*, Vol. vi., p. 13.)

A tesselated pavement has also been found in the extreme southern border of the county in the midst of the Roman iron smelting district. It is situated in a meadow on the right-hand side of the road to Monmouth, on the boundary of the parishes of Whitchurch and Ganarew. A number of coins have been found there, and the surface of the ground is very irregular, but no explorations have been made.

It is extremely probable that many other Roman Villas, if not small Roman Stations, existed in the Roman iron mining district which extended throughout the southern portion of the county and the adjoining districts of Monmouthshire and Gloucestershire. These districts are close to the Forest of Dean, from which the iron ore seems to have been brought to the woods for the fuel to smelt it. Immense beds of iron scoriæ and cinders, which in some places are from twelve to twenty feet thick, and many Roman coins and fragments of pottery have been found about there from time to time. These remains of hand "bloomeries" with ore more or less imperfectly smelted have been found, not only at Weston-under-Penyard (Ariconium), but also at Peterstow, Bridstow, Birch, Hentland, St. Weonards, Tretire, Llangaren, Walford, Welsh Bicknor, Ganarew, and many other places. Mr. Thompson Watkins has traced them for many miles round Goodrich Castle, and the number of "bloomeries" in the neighbourhood must he says have been immense. Hoards of Roman coins have sometimes been found in Herefordshire as elsewhere. At Copped Wood Hill, near Goodrich, a large collection of coins of the Lower Empire was dug up about 1817 (*Wandering of an Antiquary*, p. 14), and Mr. Thompson Watkins states that in 1855 a deposit of many thousands of the same period, were found during draining operations in the Coombe Wood at Aston Ingham, in the south east corner of the county. They appear to have been deposited in two chests ready for transport. Thirty-seven of them (now in the Gloucestershire Museum) were exhibited at the Gloucestershire Meeting of the Institute by J. Irving, Esq. They were all small brass, and were of the reigns of Maximianus, Maximinus Daza, Crispus, Constantine II., and Constantius II. The most singular fact connected with the discovery is that

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"near the spot where the coins were found," said the Catalogue of the Gloucester Museum, "there is a gate, and according to local tradition, the spot was considered to be haunted, and after nightfall persons preferred taking a long circuit to venturing through the gate."

At Longtown, close to the Roman road leading to Abergavenny, there is a spot called "Money Farthing Hill" which has no doubt derived its name from either the discovery of a large hoard of coins, or from the fact of their having been for a long period occasionally picked up.

It is a curious fact that, so far as is known at present, the only Roman Town, or Station in Herefordshire, inhabited at this time is Leintwardine, built on the site of the Roman Bravinium. All the other well recognized sites, Magna Castra, Ariconium, Cicutio, and Blackwardine are levelled and effaced. They are all cultivated. The plough turns up the surface year by year, and corn waves annually over their foundations.

CREDENHILL CHURCH.

The usual vote of thanks for the papers having been awarded, the church at Credenhill was next visited, under the guidance of the Rev. C. H. Bulmer, the rector. The church presents the very unusual feature of a triple arch opening from the nave to the chancel, affording a clear view of the altar. One of the piers between the openings is pierced with a "hagioscope" or "squint," to admit of a view being had of some ceremonial detail now not very clear to understand. Here also in a south window of the chancel is a pair of figures in richly-coloured glass, representing St. Thomas a Becket and Bishop Cantilupe; a very rare and interesting specimen of glass painting of a very early period.*

SITE OF MAGNA CASTRA IN 1882.

The carriages were then taken to return by the site of Magna Castra. The walls in the village were closely scanned for stonework from the old Roman town, and much was believed to be seen. A pull up was made on the road to the railway station to examine two stones on brick piers, which certainly came from there, and which proved to be the bases of two small columns. At the railway bridge the carriages were left, and the site of the old town visited. A portion had been recently ploughed, so that the dark colour of the soil was very evident, and some forty or fifty gentlemen, mostly in black, were soon at work upon it like a flock of crows, searching diligently, and with a result that added very much to the interest of the day's proceedings. Pieces of coarse pottery were tolerably plentiful, and many fragments of tiles scored over with deep channels in order to attach them by means of tar to the walls. Several pieces of the fine red Samian ware, imported by the Romans from Italy were also found; one piece forming a portion of a large bowl, bore an ornamental border with the figure of a lion rushing from its lair, in low relief. The pattern is such as is found in the best kinds of Roman pottery,

* See "Description of the Ancient Glass in Credenhill Church," by Rev. FRANCIS T. HAVERGAL, M.A., published by Jakeman & Carver, Hereford, 1884.

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and the glaze upon it was of great polish and beauty. Another piece of rougher pottery formed part of a mortar, or *mortarium*, having on its inner surface a great number of very small fragments of hard pebbles which were usually embedded in the clay before burning and roughened the surface so as to facilitate the grinding down of such articles as required to be rubbed with the pestle. A small coin was also picked up, but too corroded to decipher. A piece of a heavy white looking object the President's knife soon proved to be lead; and a small square of quartz looked very like a tessera, if it was not one. The Samian ware, and also the piece of the *mortarium*, will be added to the museum at the Free Library, with the date attached in memory of the Club's visit.

On reaching Hereford the usual meeting of the members took place to elect the officers for the ensuing year. George H. Piper, Esq., F.G.S., Ledbury, was chosen as President for 1883; to be supported by the following gentlemen as Vice-Presidents:—Messrs. T. Blashill, Joseph Carless, T. C. Paris, and the Rev. E. J. Holloway.

The dinner took place at the Green Dragon Hotel, when nearly 60 gentlemen and ladies had the pleasure of tasting that delicious agaric *Agaricus Clitocybe nebularis*, and some few also enjoyed *Hydnum repandum*, the mycological oyster, served in white sauce.

After dinner, a paper on "Puff-balls," teeming with wit and humour, mycological, political, and personal, was read by Dr. Cooke, and another on the "Raptores of Brecknshire," by Mr. E. Cambridge Phillips.

A reception was held in the evening at the house of Mr. Cam, in St. Owen's Street. The domestic altar described in Dr. Bull's paper was examined with very great interest, and during the evening several papers of great mycological interest were read and discussed. Mr. Blashill, the President, introduced a series of enlarged Microscopic Drawings by Miss Florence M. Reid, and made some remarks on the improved method of teaching in the public schools, which was coming into practice. He thought small museums of specimens would soon be required in all schools, and thus the teaching be rendered at once more practical, more interesting, and more effective. The President also exhibited some very beautiful drawings from the microscope, of the eggs of the parasites of birds, enlarged from 90 to 120 times. The great beauty and interest of these drawings must be seen to be appreciated. That so much variety should exist in such apparently similar objects, hidden from human sight, without the aid of powerful instruments; and that the higher they are magnified the more beautiful they become, can only suggest the thoughtful lines of George Herbert:—

"Thou art in small things great, not small in any;
Thy even praise can neither rise nor fall.
Thou art in all things one, in each thing many,
For Thou art infinite in one and all."

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The following gentlemen and ladies took part in the proceedings :—Mr. Thomas Blashill, President; Mr. C. E. Broome, Bath; Dr. Cooke, London; the Rev. Canon Du Port, Miss Du Port, Matteshall, Norfolk; Rev. John Stevenson, Glamis, Forfarshire; Messrs. James Renny, Surrey; C. B. Plowright, King's Lynn; William Phillips, Shrewsbury; T. Bennion Acton, Wrexham; G. C. Churchill, Clifton; Thomas Howse, Guildford; Henry Wharton, London; Rev. J. E. Vize and Mrs. Vize, Forden, Welshpool; Messrs. R. M. Lingwood, Cheltenham; George Cocking, Thomas and Charles Fortey, Ludlow; Dr. Bull and Miss Bull; Dr. Chapman, and Dr. J. H. Wood; Messrs. J. Annesly Owen; Cedric Bucknall, Clifton; E. Bagnall, Birmingham; W. H. Jones, Malvern; Henry Southall, Ross; Theophilus Salwey, Ludlow; George H. Piper, Ledbury; J. Griffith Morris and Mrs. Morris; Captain Williams; Mr. W. H. Harrison; the Revs. A. J. Capel, E. J. Holloway, Holland Sandford, H. B. D. Marshall, H. Stooke-Vaughan, H. W. Tweed, Augustin Ley, W. H. Purchas, C. Burrough, R. S. Strong, T. Shackleton, A. W. Horton, John Nosworthy, J. C. Grasett, V. T. T. Orgill, and J. J. Lomax; Messrs. W. A. Swinburne, John Riley, T. C. Paris, J. E. Norris, F. R. Kempson, J. Carless, W. H. Roberts, Donald Dent, J. T. Owen Fowler, J. Lawrence, J. W. Lloyd, H. C. Moore, J. Beacall, Henry Vevers, S. R. Matthews, and Theophilus Lane. At Credenhill, Mr. W. F. Ecroyd, M.P., Mrs. Ecroyd, Miss, and Miss Gertrude Ecroyd, and Mr. William Ecroyd received the visitors very cordially, and were kindly assisted by the Rev. C. H. Bulmer, Mrs. and Miss Bulmer, and some other ladies.

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Woolhope Naturalists' Field Club.

THE FUNGUS FORAY,

OCTOBER, 1882.

THE Annual Meeting for the Fungus Foray commenced by the arrival of Mycologists, at Hereford, on Monday, October 2nd. The places of meeting were fixed as follows :—

Tuesday, October 3rd, Whitcliff Wood near Ludlow.

Wednesday, October 4th, Dinedor Common and Camp.

Thursday, October 5th (Club day), Credenhill Camp.

Friday, October 6th, Haywood Forest.

Each evening a conversazione was held at the house of Dr. Bull, with the exception of Thursday evening (Club Day), when it was held at the house of Mr. Cam.

In addition to the preceding paper read at Credenhill Camp by Dr. Bull, the following papers were read and discussed during the week.

A humorous post-prandial paper by Dr. COOKE on "Puff Balls."

"The Breconshire Raptores" by Mr. E. CAMBRIDGE PHILLIPS.

"A revised list of British Discomycetes, with some suggestions as to their Classification"; and on the "Polymorphism of Rhytisma Radicale," by Mr. WM. PHILLIPS, F.L.S., &c.

"Notes on Glæocapsa sanguinea" by the Rev. J. E. VIZE, M.A., F.R. Met. Soc.

"Heterœcism of the Uredines,," and the "Classification of the Uredines," by Mr. C. B. PLOWRIGHT.

"The meaning of British Bird-names," by Mr. HENRY T. WHARTON, M.A., Oxon., F.Z.S., Member of the British Ornithologists' Union, &c.

A series of enlarged Microscopic Objects, and Drawings, by Miss FLORENCE M. REID, was exhibited at the Conversazione at Dr. Bull's house on Tuesday evening.

The PRESIDENT also exhibited Drawings from the Microscope of Eggs of the Parasites of Birds, enlarged from 90 to 120 times.

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THE FUNGUS FORAY, 1882.

HEREFORD! a name which calls up a host of pleasant memories to the present generation of British mycologists. Year after year do the devoted members of this confraternity look forward to the Woolhope week with an ardour no pluvial downpour can damp. For twelve years past it has been the privilege of the writer to be present at the Fungus Foray of the Woolhope Club, but never has the weather been more propitious than was the case this year. In the earlier days of these forays it was considered rather meritorious than otherwise to journey some 200 miles to be present, but times have changed since then. Now mycologists come double the distance, as the Rev. J. Stevenson did this year, from Glamis, in Forfarshire, and nothing is thought of it, or, as when our French *confrères* came a year or two ago, some of them from (to us) unknown regions trending towards the Jura mountains. This much is certain, that to acquire anything like an extended knowledge of the larger fungi the student must be an enthusiast. Of course any one with ordinary care and attention may learn to recognise the commoner species, but to pursue the study of the rarer, or, perhaps, it would be more correct to say, the less known and less easily recognized species, necessitates a great amount of enthusiasm, for several reasons; firstly, because the bulk of the specimens can only be obtained at one period of the year, and that but a limited one; then, as a rule, they occur in great numbers simultaneously; then, again, their ephemeral nature compels one to work at them almost night and day if their characters are to be grasped; and, lastly, the absence of any easily applicable method of preservation by which the determined specimen of one year can be compared with the gatherings of the next—if the plant appears the following year, which is by no means to be depended upon; often one has to wait several years before seeing the same fungus again. But with the motto of the Club, "Hope on, hope ever," autumn after autumn finds the working mycologists of Britain wending their respective ways to the western city, and so this year, on Tuesday, October 3, there met at Ludlow station some dozen gentlemen, including, of course, Dr. Bull, Dr. M. C. Cooke, Rev. J. Stevenson, Rev. Canon Du Port, Messrs. W. Phillips, F.L.S.; T. Howse, F.L.S., &c., after the usual hand shakings and mutual greetings, the well-known voice cried "For—ward gentlemen," and off the party started for Whitcliff Woods, not before, however, every one had expressed to every one else their extreme pleasure at seeing Mr. Broome, who was prevented last year by ill-health from attending the meetings, once again in the field, rake in hand. The first find fell to the Doctor in *Hygrophorus fornicatus*, the next to Mr. Phillips in the shape of a

"Bonnie wee *Cryptogame*,
That has na got a name."

—a very beautiful *Agaric* growing on a stump, for which, strange and wonderful to relate, no one would venture a name. The party then deployed to search for *Strobilomyces strobilaceus*, but without success. Soon afterwards a *Cortinarius* was gathered, which at once indicated what the character of these meetings was to be,

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namely, that of careful consideration and discussion of species, rather than of the indiscriminate collection of large quantities of fungi. The species in question was decided to be *Cortinarius mucifluus*, which subsequent reference to Fries' *Icones*, t. 148, f. 1, confirmed.

Amongst the many critical species which came under discussion at these meetings, were the following:—*Agaricus cucumis* and *pisciodorus*. The former is said to have saffron-coloured gills, and to smell of cucumber; the latter to have pink spores and the odour of rancid fish—the gills are spoken of as "gilvo incarnatus demum fulvellus." One would think these characters marked enough to make the recognition of these two species a question of no difficulty. It must be understood that in colour and general habit, place of growth, &c., they both resemble each other. But the smell surely will distinguish them, it may be thought—there can be no resemblance between rancid or putrid fish and cucumber. Unfortunately, however, the plant we find commonly in this country has the fishy odour when first gathered, but in the course of a few hours, as the plant dries, it passes into a distinct cucumber odour. Then it may be suggested that the colour of the spores should be compared. The spores are not so abundant in our plant as they are in many Agarics, but when collected on white paper they are of a pinkish yellow. Whatever the mycological public may think of us, we are strongly of opinion that *A. cucumis* and *A. pisciodorus*, are two states of one and the same fungus, and that *A. piceus*, Kalch., and *A. nigripes*, Trog., do not stand on too sure a foundation. Fries says of *A. piceus*, "Odor cucumerinus vel piscinus," and Kalchbrenner's figure might very well have been taken from a short-stemmed specimen of our plant; while Fries' figure of *A. nigripes*, with its yellow flesh-coloured gills, "fœtore piscis putridi," might equally well have been taken from a large specimen. Could we but find these four species all growing side by side at the same time, the question would be easy enough to settle, but as it is we must do the best we can. There may be four species, or there may be only one. There was another species which some thought was *Agaricus (Flammula) inops*, and others *A. (Hypholoma) epixanthus*. It was also a species in which the spores are few in quantity; but whoever may be right in the matter of description, in Fries' *Icones*, our plant is figured under the name of *inopus*, as any one may see who cares to turn to t. 118, fig. 1. *Lactarius serifluus* and *camphoratus* are often confounded, but, as was shown at these meetings, the former has a dark brownish pileus, and much paler gills, with a shade of yellow on them; the figure in Berkeley's *Outlines*, t. 13, f. 4, shows the colour of the pileus well, but is too dark in the gills; while *camphoratus* is a small species with the pileus inclining to dark brick-red. They both smell alike when fresh, but *camphoratus* develops when dry a powerful odour of melilot. The var. *Swartzii* of *A. fibula* and the *A. setipes* of Fries seem to us certainly identical, and we also fail in our endeavours to separate *Cantharellus tubæformis*, and *infundibuliformis*. Mr. Stevenson pointed out that we had often confounded *A. ammoniacus* with *A. alcalinus*.

But to return to the Whitcliff Woods. Mr. Stevenson gathered *A. (Flammula) lentus*, Pers., and soon after *Thelephora Sowerbei*, *Cortinarius hæmatochelis*, *Lactarius pargamenus* (hitherto confounded by us with *L. piperatus*, but easily

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known by its very narrow and extremely crowded gills) were found. Luncheon was partaken of under the Oaks, with zest and jest, especially the latter, for which the writer came in for his share far too cruelly to bear repetition. The party then made for Sunney Gutter, a vile name, traducing a most lovely stream, at which the party quenched their thirst. A few minutes later Mr. Phillips gave the "view halloo" to "*Strobilomyces!*" around two specimens of which the company gathered, gazing with subdued enthusiasm, as the Rev. J. Stevenson gathered this rare fungus which no southern hand was allowed to cull. A few minutes later *Lactarius lilacinus* was added to the list of finds, and almost directly afterwards *L. vietus*, a plant bearing some resemblance to *L. glyciosmus*, but easily distinguished from it by the absence of odour and other characters. Satisfied with their day's gathering, the mycologists started for Ludlow. On leaving the wood, a brilliant specimen of the amethyst variety of *Agaricus laccatus*, was found pinned to some railings, and attached to it a record that "Fortey and four others were gone on." How like in some respects, yet how unlike in others, to the memorable record left by Captain Crozier, of the *Erebus* and *Terror* expedition, which was found years afterwards by McClintock in the dreary Arctic regions.! But mycologists are not given to melancholy. On the road to Abbey Villa, Mr. Bagnall was met; he had unfortunately missed the party, and had wandered all day by himself in the Whitcliff Woods. His basket was turned out upon the lawn, when it was discovered that he had lighted upon some very interesting species, including the wonderful *Lactarius uvidus*, and the rare *Agaricus stans*. Messrs. Fortey once more regaled the famishing fungologists with a meal they persist in calling a tea, but which is in reality a substantial dinner in disguise. During the meal, a gentleman from Birmingham who shall be nameless, mentioned in confidence that on the road down he had pre-conceived portraits of the mycologists present, but the only individual who came up to his ideal was Mr. Broome—as for the writer of these lines, he had expected to find a venerable old gentleman, with a flowing silvery beard, after the style of old Parr it is presumed; but he was grievously disappointed when he saw—well—only the writer in *propriâ personâ*.

In the evening there was a reception at Dr. Bull's, at which the President, Thomas Blashill, Esq., exhibited some beautiful drawings of microscopic objects, and a paper was read on some experimental researches upon the "Physiology of the Uredines," which provoked an animated discussion on heterœcism. This was followed by a most valuable paper by Dr. Wharton on the "Meanings of British Birds' Names," and one by Mr. Vize on "Glæocapsa sanguinea."

Next day Dinedor Camp and Rotherwas Wood were hunted; the rare Agaricus bulbiger, however, was not to be found, although other interesting fungi were, including *Lactarius trivialis* and *Puccinia circeæ*, with its two forms of *teleutospore*. In the evening a meeting was held at the Free Library, when the work of naming and arranging the specimens was gone into with zeal.

On Thursday—the Club day—working mycologists were by 8 a.m. busy sketching and studying the specimens in the room. The collection was not by any means so large as it often is, but some very rare and interesting species were represented, amongst which were *Boletus cyanescens*, *Polyporus intybaceus*, *giganteus*,

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and *Schweinitzii*; *Lactarius uvidus*, *trivialis*, *pargamenus*, *lilacinus*, *camphoratus*; *Agaricus semitalis*, *aurivellus*, *pyrotrichus*, *petasatus*, *subpalmatus*, *holosericeus*, *columbetta*, *sordidus*, *stans*, *dryinus*; *Cortinarius impennis*, *mucifluus*, *cærulescens*, *paleaceus*, *flexipes*; *Russula depallens*, and *rubra*.

Mr. Berkeley sent a specimen of *Lycoperdon Hoylii*, and there was a *Dædalea* from Cornwall, sent by Mr. Boscawen, which some thought was *D. confragosa*. The fungologists now added to their number Miss Du Port, Mr. and Mrs. Griffith Morris, The Rev. Mr. and Mrs. Vize, Messrs. Renny, Acton, Bucknall, Churchill, Holloway, Lane, Lingwood, and others, together with a host of Woolhopeans, most of whose faces were familiar, but whose names are unknown to the writer.

The excursion to Credenhill Camp was quite an imposing ceremony, a string of carriages conveyed the Woolhopeans to Credenhill Court. Upon arrival the company were forthwith ordered to the Camp, where several hours were spent searching for fungi and admiring the camp itself. At two o'clock the Doctor read his paper on "Credenhill Camp—Magna Castra," which was highly spoken of by those fortunate enough to hear it, but unfortunately the writer was not one of them. It so happened that just as we should have adjourned to the trysting place, the Canon, in finding *Russula rubra*, lost his digger. Now it so happens that this is a *Russula* far from common, although many things have been called by this name. Some half-dozen fungologists sympathising in the loss of the weapon, and partly led on by the desire of gathering further specimens of the *Russula*, stayed behind to prosecute the search, and so missed the paper and only gained the carriages as they were starting. However, all were safely got on board and the start made. We were rattling along, thinking of the fungus dinner in store for us at the "Green Dragon," when the commissioner of the Woolhope Club, who of course led the van, suddenly held up his hand and cried "Hold!" in a voice which made us all tremble. We were at the time going down hill at a breakneck speed, but the drivers pulled up their horses and by applying the breaks vigorously to the wheels succeeded in bringing the carriages into a state of stable equilibrium directly opposite a gentleman's house. What is the matter? Something serious must have happened. Had the Doctor left his spud in the camp? or, worse than that, had he forgotten his basket of funguses? Nothing of the kind happily. The President gravely rose in his seat and pointing straight at the front door of the house in the calmest and most collected manner, said, "Debased Corinthian capitals," and away we sped, before the owner of the house could rush out to see what was the matter. It turned out that two stones found in Magna Castra had been placed upon the garden wall, so it was no accident after all, but a part of the programme into which we, the benighted mycologists, had not been initiated.

We had not proceeded far before another stop was made, but not so suddenly as the first. "What is the matter now?" was asked as the company fairly tumbled out of the carriages. "Going to see Magna Castra," was the reply, and the party disappeared through a gateway. It is a lamentable fact to have to relate, but a few bigots actually kept their seats and studied their specimens, while one of their number read Fries' *Monographia* till the rest returned. They came back in a body,

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through a gap in the hedge, covered with mud and laden with pieces of pottery, ancient and modern, Roman and Victorian, fragments of urns, potsherds, stones, and the like. One gentleman cherished half an old flower-pot, while another was intensely happy with a lump of verdigris, which he carefully wrapped in paper and put into his purse with good nineteenth century sovereigns,—as a Roman penny. The journey was resumed, and Hereford duly reached in safety, the dinner at the "Green Dragon" enjoyed, *Agaricus nebularis* tasted—all without a hitch. After dinner Dr. Cooke read a humorous paper on "Puff Balls" that gave every one a hearty laugh, and which was so good that it had to be re-read the following evening at Dr. Bull's. Mr. E. Cambridge Phillips read an interesting paper on the "Breconshire Raptores." The company adjourned to Mr. Cam's, where, after tea and coffee, their exuberant spirits were considerably quieted by a paper on the "Classification of the Uredines," which was listened to with admirable fortitude, for it was terribly technical. The President exhibited and demonstrated a very interesting Roman relic, a domestic altar recently found in Hereford.

Friday, the last day, was devoted to an excursion to Haywood Forest, where many rare and interesting specimens were found, including *Cortinarius*, which provoked much discussion as to whether it was *C. saginus* or *C. triumphans*; *Thelephora caryophyllea*, *Agaricus lampropus* and *ambustus*, and a new *Rhinotrichum* found by Mr. Vize. At the evening meeting at Dr. Bull's, Mr. Phillips read his paper on the "Polymorphism of Rhytisma radicale," and the Woolhope Fungus Forays of 1882 passed into history as they began, with a general hand-shaking all round. May we all meet again next year, to have as profitable and as pleasant a series of meetings.—CHARLES B. PLOWRIGHT, King's Lynn, *Gardener's Chronicle*, October 14th, 1882.

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POLYMORPHISM OF RHYTISMA RADICALE *(Cke.)*, PROVING TO BE AN EPHELIS *(Fries.)*.

By Mr. Wm. Phillips, F.L.S.

Rhytisma Radicale, *(Cke.)*, was first described by Dr. Cooke in "*Grevillea*," Vol. viii., p. 9., in 1879, in the following words:—"Black, opaque, ambient, splitting irregularly, and exposing the grey hymenium; asci cylindrical; sporidia uniseriate, clavate, hyaline, (.012 x .003 mm); stylospores, produced earlier in the season, fusiform, acute, triseptate (.07 x .005 mm). About the roots of *Rhinanthus crista galli*. North of Scotland—found by Mr. Taylor. Gouty swellings are formed by the stylosporous and ascosporous conditions. The sporidia apparently not fully mature." I have been allowed to copy Dr. Cooke's drawing and to see the original specimen. The stems of the plant affected by this fungus have very much the appearance of having the lower part near the root, but above ground, surrounded by a coating of pitch from half an inch to one inch in extent from top to bottom, and swelling out near the centre. In June last my friend, the Rev. James Keith, of Forres, well known as a careful observer, sent me some stems of *Rhinanthus crista galli*, with the following remarks:—"In August of last year I discovered, at the base of the stems of *Rhinanthus cristi galli*, swellings from half an inch to one inch long, coated over with a carbonaceous covering. There was no appearance of fruit of any kind. The substance when crushed under the microscope looked exactly like that of a Sclerotium. Nevertheless, having noticed Cooke's *Rhytisma radicale*, I thought it might be an immature state of that species, and on submitting a specimen to him he so named it. I kept my eye on the plant during the winter. The smooth coating of the swellings gradually roughened, and became dotted over with what looked very like perithecia as if of a *Cucurbitaria*. Owing to being unwell I have not been able to get to the place till to-day, when I have been much surprised to find that what I took for perithecia have developed into *Peziza* cups, or at least some *Discomycete*."

On examining the specimens forwarded by Mr. Keith I found, as he described, a black stroma, the internal structure exactly resembling that of some Sclerotia, over the surface of which was a bed of closely set cups about the size and general aspect of *peziza cinerea*. From mutual pressure the cups were irregular in outline, with a thin, well developed margin. The hymenium concave, cinerous when moist, black when dry. The *asci* were cylindraceo-clavate, having eight sporidia in each. The sporidia were oblong-elliptic, colourless, frequently with three guttulæ. The paraphyses linear, and rather stout. I have examined these cups with a view of ascertaining whether there is any genetic connection between them and the stroma on which they rested, and I have fully satisfied my mind that there is such a connection. The tissue of the stroma runs up without any break into the cup forming the sub-hymenial tissue. The cortical layer of the stroma is also continued upwards without any sign of separation, so as to form the exterior

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of the cup. I obtained from Mr. Keith some specimens less advanced in growth, and Dr. Cooke has kindly lent me his less advanced specimens; from the examination of these I was enabled to detect beneath the undulating surface of the stroma small cavities, each indicated by a slight tuberculate elevation of the surface, containing a layer of upright slender filaments bearing on their apices very minute spherical bodies. Of the true nature of these bodies I am at present ignorant, and simply content myself with indicating their existence.

The question that now presents itself is to what genus can we refer this fungus in the more perfect form it is now found to assume? Clearly not to *Rhytisma;* for the perithecia in that genus open by flexuous fissures, and never assume a peziza-like form. Fries describes a genus which he names *Ephelis* in his "*Summa Vegetabilium Scandinaviæ*" p. 370, immediately preceding his genus *Rhytisma*, exactly agreeing with our plant, in the following words "Perithecium (stroma) crustaceo-effusum, hinc inde tuberculosum, tuberculis in excipula cuplaria dehiscentibus." (The perithecium, or stroma, forming an effused crust, here and there tuberculose, the tubercles bursting out at length into cup-shaped excipula). To this genus I propose to remove it under the name of *Ephelis Keithii*.

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GLŒOCAPSA SANGUINEA, AG.

By the Rev. J. E. Vize, M.A.

In speaking to you about *Glœocapsa sanguinea* now, I am not aware that in investigating this Alga, with a special view to your attention for a few minutes, I shall be able to make either any new discoveries or any startling facts. Still *Glœocapsa sanguinea* does claim very nearly *par excellence* to be one of the most beautiful microscopical objects known. It wants one thing which from its structure it never can get, viz: motile power, and then it might have rivals to equal it, but none would surpass it, not even *Volvox globator*, to which it is in some points related. Viewed under a low power, say one inch objective, there is not much to be seen, but under a quarter inch its beauties then are manifest. There is an exquisite amount of colouring matter, which exists in the centre of each plant, and which in the centre is of an extra intensity, on account of the overlapping of one plant on the other. This by degrees becomes toned down to the most delicate rosy tint. It would be folly for me to attempt to make a drawing of it. No one could do justice to it. Dr. Greville, whose *Scottish Cryptogamic Flora* we all are supposed as mycologists to know, would not make a true copy, I am sure. This lowly alga is the work of Nature, in plain words, of God, and God's work cannot be equalled—imitation, useful as it is, is not perfection. If you notice it, then, under the microscope you will see that the plants consist of somewhat spherical cells; they may be found singly or numerously associated together in groups, enclosed, however, in a transparent covering. Take one of these single cells, or a double one surrounded by its case; spontaneous division occurs, and the two daughter cells are formed within the parent cell, there being a covering for both. This process goes on still further. The daughter cell becomes the external covering for another daughter cell, until the whole family is encased within the one external sheath. This is how the first cell doubles, then the 2 become 4, the 4 become 8, 8 become 16, 16 become 32, and so on. This process of sub-division is not peculiar to *Glœocapsa*. *Volvox* proceeds on a similar system. It is of course almost needless to say that the last formed are smaller than those formed before, and so in regular progression. Occasionally there may be found some fronds of *Glœocapsa* which are not of a rosy colour at all; they are of a blue or greenish tint. I take them to be a condition of life quite elementary, as compared with the older forms; the blue will become pink, a process not new to *Algæ*. Take *Protococcus*, for example, in which you see both colours continually together, with the various shades between the two. The shape of these is occasionally not unlike a *Diplodia* in part of its growth. Shapes, however, are very various. I suppose that according to the number of cells will be the number of plants afterwards. The *Diplodia* shape, having its septum, would begin with two plants, and go on with its daughter cells in course of development; whereas a *Glœocapsa*, with four, five, six, or more divisions, would grow with an exactly corresponding and proportionate increase of

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daughter cells. This renders the solution of the fact of many perfect plants being contained within the outer spherical cell, and the inequality of their numbers in that cell, satisfactory. No reproductive process is known, save division. None of its class and congeners produce *zoospores*. It is of a bright chocolate colour in the mass; dryish and friable in ordinary weather; in wet times it is sticky and glutinous. It may be said of what use can these *algæ* be? The answer, although not so transparent as in many other instances, is, that every earthly thing is of use. The *Glœocapsa* on the damp rock performs its mission in life. In the mass there may be but little to attract attention; nevertheless, it would not be there if utterly useless. It often happens that the very small things which to the unassisted eye are of no importance, are amongst the most splendid things in creation. Take, for instance, the *diatomaceæ*, the scales of some of the *lepidoptera*, the *entomostraca;* take the fungi *Asterosporium Hoffmanni*, the entire genus of *Pestalozzia;* take this *Glœocapsa*, as already has been said, the artist cannot do justice to it. There is a use for it; it is a microscopical glory; small though it is, it has engaged the attention of us to-night. With regard to its geographical distribution, it is found in Great Britain sparingly, also in Norway, Sweden, Italy, Austria. As far as I have been able to ascertain, it is unusual to be able to get a clean gathering of it, as it is generally intermixed with a large amount of other *algæ* and mud.

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EXPERIMENTS UPON THE HETERŒCISM OF THE UREDINES.

By Mr. Charles B. Plowright.

The following thirty-five experiments are a portion of two series of experimental cultures conducted during the years 1881 and 1882 upon the physiology of the *Uredines*. They are published at the request of several of my friends who are interested in the subject, and who consider further evidence upon the phenomena of heterœcism desirable. It may be observed that the species with which these experiments were commenced, and which was the prime cause of their performance at all, was the *Æcidium* upon *Berberis vulgaris*. In the summer of 1881 a number of cultures were made with the spores of this fungus upon wheat; the result obtained was that in twelve out of thirteen of these experiments *Uredo linearis* followed the infection of the plants with the *Æcidium* spores; but in no less than eleven of them did the *Uredo* appear upon the uninfected wheat plants kept as control plants.* The consequence was that my faith in the heterœcismal character of this species was so much shaken that I was hardly able to believe in it at all.

During the spring and summer of the present year (1882), however, a second series of experiments was instituted, which had not been long in existence before overwhelming evidence of the heterœcismal nature of several species was forthcoming. In these cultures various and less common *Uredines* were employed, so that the error of accidental sporadic infection, it is scarcely possible to believe, could have taken place time after time, with species after species. To take, for instance, the *Rœsteliæ*. Of all heterœcismal cultures the easiest successfully to conduct are those in which the *Podisomæ* are employed as infecting material; at least such is my experience, although Prof. Farlow ha not been so successful with his cultures† in America. On every occasion upon which I have infected hawthorns with *Podisoma juniperi*, and pears with *P. sabinæ*, the corresponding *Rœsteliæ* have been produced. Now both these *Rœsteliæ* are very uncommon plants near King's Lynn. With *Gymnosporangium juniperi* upon mountain ash, four out of five cultures were successful, which is the more noteworthy when it is remembered that the *Gymnosporangium* was sent from Forres, in the north of Scotland (some 400 miles away), by my friend the Rev. James Keith, it being a plant that does not grow in this district.

All the cultures of *Puccinia graminis* on barberry were successful, the control plants remaining free from the fungus.

With *Æcidium berberidis* on wheat the three experiments performed were all entirely successful, the check plant remaining free from the fungus. Both the infected and the control plants in these last-named experiments were raised under

* Plowright, *Grevillea*, vol. x., p. 40.
† Farlow, *The Gymnosporangia of the United States*, pp. 34, 35.

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bellglasses, and covered by them continuously, except for the few minutes necessary to perform the infection, until the end of the experiment, so that the source of error from accidental atmospheric infection was reduced to a minimum.

The culture of *Peridermium pini* on the common groundsel *(Senecio vulgaris)* has with me been one of the most difficult to perform. After several successive failures, however, I succeeded in two instances in producing the *Coleosporium*.

By the infection of *Poa annua* with the spores of *Æcidium tussilaginis*, the *Puccinia poarum* of Nielsen was in three out of four cultures produced—a *Puccinia* hitherto unknown in Britain.

Perhaps the most interesting of the series, however, was the production of *Æcidium zonale* on *Inula dysenterica* (also a fungus new to the British flora) by infection with *Uromyces junci*. This was successful in every experiment. The actual demonstration of this heterœcism had not hitherto, I believe, been made, although Fuckel* had the strongest ground for believing it to exist.

In one of these experiments some fragments of *Juncus obtusiflorus*, with numerous pustules of *Uromyces*, in active germination, on them, were placed upon the upper leaves of a plant of *Inula dysenterica;* in the course of ten or fifteen days these leaves began to show the yellow spots, which were the forerunners of the *Æcidium*. By this time the plant had grown taller, and had developed fresh leaves above those on which the *Juncus* had been placed. The fragments of *Juncus* were then removed from the leaves, on which they had been in the first instance placed, to the healthy, recently expanded leaves above, where in due course the *Æcidium* was developed. It was very interesting to observe how the *Æcidium* could thus be produced in successive crops.

Podisoma sabinæ and Ræstelia cancellata.

Exp. 2.—Six pear seedlings had fragments of *Podisoma sabinæ* placed on each on 19th April; on 6th May the spermogonia of *Ræstelia cancellata* appeared on them.

Exp. 6.—Three pear seedlings were infected on the 13th April with *Podisoma sabinæ;* on 24th April yellow spots appeared; on 6th May spermogonia were abundant on all three plants.

Exp. 10.—Four pear seedlings infected with *Podisoma sabinæ* on 14th April at 8 a.m. On 6th May every plant had spermogonia on it.

Exp. 25.—11th May. Some *Podisoma sabinæ*, which had been soaked for 48 hours in water in a watch-glass, was placed on some leaves of a pear tree in Mr. T. Pung's garden. Having some doubt of the efficacy of the material, these leaves were reinfected on the 25th May. On 11th June spermogonia appeared on one leaf. There were many pear trees in this garden, but this was the only pear leaf on which the fungus could be found. This leaf was gathered during the last week of September, and exhibited at Hereford. It never got beyond the spermogonial condition.

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* Fuckel, *Symbol. Mycol.*, p. 61.

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PODISOMA JUNIPERI AND RÆSTELIA LACERATA.

Exp. 4.—Two thorn seedlings *(Cratægus oxyacantha)* infected on 10th April with *Podisoma juniperi.* On 24th abundance of spermogonia; on 25th May perfect *Rœstelia lacerata* on both these plants.

Exp. 5.—Three similar plants were on 7th April infected with *Podisoma juniperi* very freely. 24th April the leaves were yellow with spermogonia; 25th May perfect *Rœstelia* was produced.

Exp. 15.—Two similar plants infected on 17th April. On 6th May spermogonia noted, and on 3rd June the perfect *Rœstelia* on both plants.

Exp. 16.—Three similar plants infected on 17th April. On 6th May spermogonia noted, and on 3rd June the perfect *Rœstelia* on all these plants.

Exp. 27.—On 11th May the leaves on the lower branch of a hawthorn tree in Mr. T. Pung's garden were infected with *Podisoma juniperi.* On the 21st the spermogonia appeared on five leaves, which in due time developed into the perfect *Rœstelia.* On no other part of this tree, nor on any other thorn, either bush or hedge, in this garden, was any specimen of either the spermogonia or the perfect fungus to be seen.

GYMNOSPORANGIUM JUNIPERI AND RÆSTELIA CORNUTA.

Exp. 43.—Five small plants of *Sorbus aucuparia* were on the 29th May infected with *Gymnosporangium juniperi,* sent by the Rev. James Keith from Forres; on 25th July spermogonia appeared on three leaves; on 4th September the perfect *Rœstelia cornuta* was observed.

Exp. 44.—Five similar plants were infected on the 29th May. On 21st June yellow spots appeared; on 1st July spermogonia were seen, and on the 4th September the perfect *Rœstelia.*

Exp. 63.—One small mountain ash *(Sorbus aucuparia)* was infected on the 12th June with *Gymnosporangium juniperi,* sent by Rev. J. Keith from Forres. On 16th August spermogonia were noted.

Exp. 73.—A similar plant was on the 18th June infected with the same material. On 1st July spermogonia appeared, and on 30th August the perfect *Rœstelia.* It should be observed that I had never seen this fungus in Norfolk until it was produced by artificial infection with the *Gymnosporangium.*

PUCCINIA GRAMINIS AND ÆCIDIUM BERBERIDIS.

Exp. 11.—On 14th April a three-year-old plant of *Berberis vulgaris* was infected with the germinating teleutospores of *Puccinia graminis* (on *Triticum repens*), and covered with a large bellglass. As the supply of infecting material was on this occasion limited, the process was completed on the following day (the 15th), and on the 17th. The bellglass was not removed until the 24th. On 6th May spermogonia appeared, and on the 24th the perfect *Æcidium* was noted on 20 leaves. A precisely similar barberry kept as a control plant had no *Æcidium* upon it, although grown in the same garden, and carefully observed throughout the summer.

Exp. 14.—A similar barberry plant was on the 17th April infected with the

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same material. On the 6th May spermogonia and on 3rd June perfect *Æcidia* were noted, the control barberry remaining free from the fungus.

Exp. 19.—On 9th May a similar barberry was infected. On 25th spermogonia and on 15th June perfect *Æcidia* were noted. The control barberry remained free from the fungus.

Æcidium berberidis and Puccinia graminis.

Exp. 48.—24 wheat seedlings growing in a flower pot, which had been continually covered by a bellglass from the day the wheat was sown, were on 23rd May infected with ripe spores of *Æcidium berberidis*, sent for the purpose by Mrs. Howell, of Drayton Rectory. On the 3rd June sickly yellow spots appeared on some of the plants: on the following day (4th June) true *Uredo linearis* made its appearance. On 8th June the pot was removed from the garden into a room in the house, and the diseased plants removed. By the 30th every plant had the parasite on it. A similar pot of wheat seedlings grown under exactly similar conditions, but not infected with *Æcidium* spores, remained free from *Uredo*.

Exp. 80.—Five wheat plants which had been reared under a bellglass were on the 28th June infected with *Æcidium berberidis* spores from Exp. 14; on 17th June *Uredo* appeared on one leaf, and three days later on the others. The five control wheat plants remained healthy.

Exp. 81.—Many wheat seedlings reared under a bellglass were on 28th June infected with *Æcidium berberidis* spores; on 16th August *Uredo* was noted on them. A similar pot of wheat seedlings not infected with the *Æcidia* spores remained healthy.

Puccinia caricis and Æcidium urticæ.

Exp. 2.—On the 8th April three plants of *Urtica dioica* were planted in a flower pot; around them was laid a quantity of *Carex hirta*, with last year's *Puccinia caricis* on it. The pot was covered by a bellglass, and freely watered. On 2nd May two of the plants were heavily affected with *Æcidium urticæ;* on 6th May the nettles were planted out, and the Carex straw removed and destroyed. On 9th May all three plants were much distorted, both on their stems and on their leaves, with the *Æcidium*.

Æcidium urticæ and Uredo caricis.

Exp. 33.—On May 15th a clump of healthy *Carex hirta* grown in a flower pot under a bellglass for three weeks, had two leaves of nettle with *Æcidium* on them from the previous experiment (Exp. 9) laid upon it; on 15th June *Uredo caricis* made its appearance, and by 1st July it had affected many of the Carex leaves.

Exp. 49.—Three scions of *Carex hirta* from South Wootton were on the 26th May infected with spores of *Æcidium urticæ;* on 3rd June sickly spots were noted, which five days later (on 8th) were the site of *Uredo* pustules. On 21st all the plants were affected with the *Uredo*.

Exp. 26 (1881).—Four plants of *Carex hirta* were infected on 21st July with *Æcidium urticæ*, and four similar plants kept as checks. On 15th August *Uredo*

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appeared in two of the infected plants. The check plants remained free from the fungus, as did 33 other individuals of *Carex hirta* growing in the same garden.

PUCCINIA MAGNUSIANA AND ÆCIDIUM RUMICIS.

Exp. 18.—Two plants of *Rumex hydrolapathum* and two of *P. obtusifolium* were planted in a large flower pot, and surrounded with leaves of *Phragmitis* communis, on which the teleutospores of last year's *Puccinia magnusiana*, were abundant. The pot was covered with a bell-glass, and freely watered. On 3rd June red spots appeared on the leaves of the *R. hydrolapathum*, which, by the 6th June, developed into perfect *Æcidium rumicis*. No *Æcidia* appeared on the *R. obtusifolium*.

Exp. 32.—Three plants of *Rumex hydrolapathum* were similarly surrounded with reed leaves on 15th May. On 6th June perfect *Æcidium rumicis* was developed on all three plants.

ÆCIDIUM RHAMNI AND PUCCINIA CORONATA.

Exp. 55.—A flower pot of seedling oats were infected on 7th June with *Æcidium rhamni*. On the 10th July there was an appearance like *Uredo*. On 10th August the *Uredo* of *Puccinia coronata* was gathered.

Exp. 76.—A number of oat seedlings were on 23rd June infected with *Æcidium rhamni*. On 12th June *Uredo* of *P. coronata* appeared.

ÆCIDIUM TUSSILAGINIS AND PUCCINIA POARUM.

Exp. 84.—Four plants of *Poa annua* were on 29th July infected with *Æcidium tussilaginis*. On 10th July *Uredo* appeared, and on the 18th the perfect *Puccinia*, which had hitherto not been recorded as British.

Exp. 85.—Three plants of *Poa annua* were on the 29th June infected with *Æcidium tussilaginis*. On 10th July the *Uredo* and on the 18th the *Puccinia* appeared.

Exp. 86.—A number of plants of *Poa annua* in a pot were infected with the *Æcidium* on 29th June. On 10th July the *Uredo*, and on the 18th July the *Puccinia* appeared.*

UROMYCES JUNCI AND ÆCIDIUM ZONALE.

Exp. 40.—Germinating *Uromyces junci* was on the 25th May placed on three plants of *Inula dysenterica*. On 4th June yellow spots appeared on all these plants, which by the 21st developed into perfect *Æcidium zonale*.

Exp. 42.—Germinating *Uromyces junci* was placed on two plants of *Inula dysenterica* on 29th May. On 12th June abundant yellow spots were noticed, which by the 21st had developed into perfect *Æcidium zonale*.

Exp. 64.—Three plants of *Inula dysenterica* were on 8th June infected with *Uromyces junci*; by 30th perfect *Æcidium zonale* was abundantly produced on all

* Note *Poa annua* is a common weed in the garden in which these experiments were performed, as it is in every garden, but on no other plant of this grass could the *Puccinia* be found, although careful search was made, except those upon which the spores of *Æcidium tussilaginis* had been placed.

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three plants. To this experiment three control plants were kept which remained perfectly free from the fungus.

PERIDERMIUM PINI AND COLEOSPORIUM SENECIONIS.

Exp. 31.—Two plants of *Senecio vulgaris* were on the 13th May infected with *Peridermium pini*. On 2nd June the *Coleosporium* appeared on both plants.

Exp. 54.—Four plants of *Senecio vulgaris* were on 7th June infected with *Peridermium pini*. On 28th the *Coleosporium* appeared. Many plants of *Senecio vulgaris* existed in the garden, but none of them, either at the time these experiments were performed, nor before, nor since, have had any trace of the fungus upon them.

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CLASSIFICATION OF THE UREDINES.

By Mr. C. B. Plowright.*

The following arrangement of British species is founded upon that of Schröter, as modified and applied by Dr. Winter and the present writer.

Uromyces, *Link.*

A. **Lepturomyces.** Teleutospores only; which germinate at once.

B. **Micruromyces.** Teleutospores only, which easily fall from their stems, and germinate only after a period of rest.

U. ficariæ, Schum.; *U. ornithogali*, Walir.; *U. scillarum*, Grev.

C. **Hemiuromyces.** Uredo and teleutospores.

U. scutellatus, Schr. (U. excavata, *DC.*); *U. tuberculatus*, Fckl.; *U. rumicis*, Schum. (U. apiculatus; U. bifrons, *DC.*); *U. alchemillæ*, Pers. (U. intrusa, *Lev.*); *U. sparsus*, Kze. and Schm.

D. **Uromycopsis.** Æcidio—and teleutospores.

U. scrophulariæ, DC. (U. concomitans, *B. & Br.*): *U. behenis*, DC.

E. **Euromyces.** Having æcidio, uredo, and teleutospores.

(a.) *Auteuromyces.* All three spore forms on the same host plant.

U. polygoni, Pers.; *U. betæ*, Pers.; *U. salicorniæ*, DC.; *U. limonii*, DC.; *U. valerianæ*, Schum.; *U. phaseoli*, Pers. (U. apiculatus); *U. orobi*, Pers. (U. fabæ, *Pers.*); *U. trifolii*, A. & S.; *U. parnassiæ*, Grev.

(b.) *Hetereuromyces.* Spermogonia and æcidio-spores upon one host-plant; uredo and teleutospores upon another.

U. dactylidis, Otth. (U. graminum, *Cke.*); Æcidiospores on *Ranunculus acris, repens*, and *bulbosus*. Teleutospores on *Dactylis glomerata*.

U. poæ, Rabh. Æcidiospores on *Ranunculus ficaria*. Teleutospores on *Poa nemoralis*, and *P. pratensis* (not British).

U. junci, Desm. Æcidiospores on *Inula dysenterica*, L. Teleutospores on *Juncus obtusifolius*, Ehr.

U. pisi, Pers. Æcidiospores on *Euphorbia cyparissias*, L. (British?). Teleutospores on *Vicia cracca*, L.; *Pisum arvense*, L., *Pisum sativum*, L., *Lathyrus tuberosus*, L., *Lathyrus pratensis*, L., and *L. sylvestris*.

Puccinia, *Pers.*

A. **Leptopuccinia.** Having only teleutospores which are firmly fixed to the host-plant, and germinate at once while still attached.

P. buxi, DC.; *P. annularis*, Str. (P. Scorodoniæ, *Lk.*); *P. verrucosa*, Schultz (P. glechomatis, *DC.*): *P. veronicæ*, Schum.; *P. asteris*, Duby. (P. millefolii, *Fckl.*); *P. valantiæ*, Pers. (P. acuminata, *Fckl.*); *P. chrysosplenii*, Grev.; *P.*

* For remarks upon this Classification, see *Grevillea*, page 151 of Vol. xi., 1882-83; and Mr. Plowright's reply on page 36 of No. 61, for September, 1883.

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circææ, Pers.; *P. malvacearum*, Mont.; *P. arenariæ*, Schum. (P. lychnidis, P. Dianthi, P. mœhringiæ, &c.)

B. **Micropuccinia.** Having only teleutospores, which soon fall off, and germinate only after a period of rest.

P. asarina, Kunze; *P. betonicæ*, A. & S.; *P. companulæ*, Carm; *P. virgaureæ*, DC.; *P. ægopodii*, Schum.; *P saxifragæ*, Schlecht; *P. rhodiolæ*, B. & Br.; *P. Fergussonii*, B. & Br. (P. nidificans, *Magn.*); *P. Thalictri*, Chev.; *P. umbilici*, Guep.

C. **Hemipuccinia.** Having only uredo and teleutospores.

P. Baryi, B. & Br. (P. linearis, *Rob.*); *P. phragmitis*, Schum. (P. arundinacea, *DC.*); *P. scirpi*, DC., King's Lynn; *P. oblongata*, Lk. (P. luzulæ, *Lib.*); *P. iridis*, DC. (P. truncata, *B. & Br.*); *P. polygoni*, A. & S.; *P. polygoni-amphibii*, Pers. (P. amphibii, *Fckl.*); *P. bistortæ*, Strauss; *P. oxyriæ*, Fckl.; *P. vincæ*, DC.; *P. suaveolens*, Pers. (P. cirsii, *Lasch.*); *P. bullata*, Pers. (P. conii, æthusæ, apii, &c.); *P. pruni-spinosæ*, Pers.; *P. argentata*, Schulz (P. nolitangeris, *Corda*); *P. hydrocotyles*, Pers., Epping, Sept., 1882.

D. **Pucciniopsis.** Having only æcidio and teleutospores.

P. conglomerata, Strauss (P. syngenesiarum, *Lk.*; P. senecionis, *Lib.*; P. glomerata, *Grev.*); *P. bunii*, DC. (P. bulbo-castani, *Fckl.*); *P. grossulariæ*, Gmel.; *P. fusca*, Relh. (P. anemones, *Pers.*); *P. smyrnii*, Corda.

E. **Eupuccinia.** Having æcidio, uredo, and teleutospores.

(a.) Auteupuccinia. All spore-forms on the same host-plant.

P. porri, Sow. (Uredo alliorum, *DC.*); *P. asparagi*, DC.; *P. Thesii*, Desm.; *P. soldanellæ*, DC. (?); *P. primulæ*, DC.; *P. menthæ*, Pers. (P. clinopodii, DC.); *P. flosculosorum*, A. & S. (P. compositarum, *Schl.*; P. lapsanæ, *Fckl.*; P. syngenesiarum, *Corda*; P. cirsii, *Fckl.*; P. centaureæ, *DC.*; P. hieracii, *Mart.*; P. variabilis, *Grev.*); *P. tragopogi*, Pers. (P. sparsa, *Cke.*); *P. tanaceti*, DC. (P. discoidearum, *Lh.*); *P. Galii*, Pers. (P. valantiæ, *A. & S.*; P. difformis, *Kunze*); *P. adoxæ*, DC.; *P. pimpinellæ*, Strauss (P. umbellifearum, *DC.*; P. Heraclei, *Grev.*; P. angelicæ, *Fckl.*; P. chærophylli, *Purt*); *P. saniculæ*, Grev.; P. *epilobii-tetragoni*, DC. (P. epilobii, *DC.*; P. pulverulenta, *Grev.*); *P. silenes*, Schrot.; *P. violæ*, Schum.; *P. calthæ*, Link.

(b.) Hetereupuccinia. Spermogonia and æcidiospores upon one host-plant, uredo and teleutospores upon a different host-plant.

P. graminis. Æcidiospores on *Berberis vulgaris*, L. Teleutospores on wheat and various grasses.

P. rubigo-vera, D.C. Æcidiospores on *Lycopsis arvensis*, L. *Echium vulgare*, L. *Symphytum officinale*, L. Teleutospores on various grasses. Var. *simplex*, Körn; on barley and various species of *Hordeum*.

P. coronata, Corda. Æcidiospores on *Rhamnus frangula*, L., and *R. catharticus*, L. Teleutospores on various grasses.

P. moliniæ, Tul. Æcidiospores on *Orchis maculata*. Teleutospores on *Molinia cærulea*.

P. poarum, Niel. Æcidiospores on *Tussilago farfara*, L. Teleutospores on *Poa annua* and *P. pratensis*, L.

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P. Magnusiana, Körn. Æcidiospores on *Rumex hydrolapathum*, Huds. Teleutospores on *Phragmitis communis*.

P. sessilis, Schneider. Æcidiospores on *Allium ursinum*, L. Teleutospores on *Phalaris arundinacea*, L.

P. caricis, Schum. Æcidiospores on *Urtica dioica*, L. Teleutospores on various Carices.

P. sylvatica, Schröter. Æcidiospores on *Taraxacum officinale*, W. Teleutospores on *Carex muricata*, L.

GYMNOSPORANGIUM, *D.C.*

G. sabinæ, Dicks. Æcidiospores on *Pyrus communis*. Teleutospores on *Juniperus sabina*, L.

G. clavariæforme, Jacq. Æcidiospores on *Cratægus oxyacantha*. Teleutospores on *Juniperus communis*, Lk.

G. juniperinum, Linn. Æcidiospores on *Sorbus aucuparia*, L. Teleutospores on *Juniperus communis*, L.

TRIPHRAGMIUM, *Link.*

T. ulmariæ, Schm.

PHRAGMIDIUM.

A. **Phragmidiopsis.** Having only æcidio and teleutospores.

P. carbonarium, Schl.

B. **Euphragmidium.** Having æcidio, uredo, and teleutospores.

P. subcorticatum, Schrank; *P. fragariæ*, D.C.; *P. rubi*, Pers., *P. violaceum*, Schultz; *P. rubi-idæi*, Pers.

CRONARTIUM, *Fries.*

C. flaccidum, A. & S.

MELAMPSORA, *Cart.*

A. **Micromelampsora** Only teleutospores known.

B. **Hemimelampsora.** Having uredo and teleutospores.

M. betulinæ, Pers.; *M. salicis-caprearum*, Pers.; *M. helioscopiæ*, Pers.; *M. hypericorum*, DC.; *M. lini*, Pers.; *M. cerastii*, Pers.; *M. circæ*, Schum.; *M. epilobii*, Pers.; *M. vaccinii*, A. & S.; *M. padi*, K. & S. (Uredo porphyrogenita, *Link.*).

C. **Melampsoropsis.** Having only æcidio and teleutospores, the uredospores being wanting.

M. goeppertiana, Kühn. Æcidiospores on *Pinus pinea*, L. (Æ. columnare, *A. & S.*), not British. Teleutospores, on *Vaccinium vitis-idæa*, L.

D. **Eumelampsora.** Having æcidio, uredo, and teleutospores.

M. populina, Jacq. Æcidiospores on *Clematis vitalba*. Uredo and teleutospores on *Populus nigra*.

COLEOSPORIUM, *Lev.*

A. **Hemicoleosporium.** Having only uredo and teleutospores.

C. euphrasiæ, Schum.; *C. campanulæ*, Pers.; *C. sonchi-arvensis*, Pers.

B. **Eucoleosporium.** Having æcidio, uredo and teleutospores.

C. senecionis, Pers. Æcidiospores on *Pinus sylvestris*, L. (*Peridermium pini*). Teleutospores on various species of *Senecio*.

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ENDOPHYLLUM, *Lev.*

E. euphorbiæ-sylvatica, DC. (?); *E. sempervivi*, A. & S.

APPENDIX.

Isolated spore-forms of *Uredo* and *Æcidium*, the affinities of which are at present doubtful.

UREDO. Spores borne singly on the apex of each basidium.

U. agrimonia-eupatoriæ, DC.; *U. polypodii*, Pers.; *U. phillyreæ*, Cooke; *U. quercûs*, Brond; *U. symphyti*, DC.

CÆOMA. Spores produced in chains, but without any pseudo-peridium, with or without paraphyses.

C. orchidis, A. & S.; *C. mercurialis-perennis*, Pers.; *C. empetri*, Pers.; *C. euonymi*, Grev.; *C. tropæoli*, Desm., on *Tropæolum aduncum*.

ÆCIDIUM. Spores in chains, surrounded by a pseudoperidium.

Æ. ari, Desm.; *Æ. strobilinum*, A. & S. (Licea strobilina, *A. & S.*); *Æ. elatinum*, A. & S.; *Æ. pedicularis*, Libosch.; *Æ. compositarum*, on *Bellis perennis*, L.; *Æ. periclymeni*, DC.; *Æ. phillyreæ*, DC.; *Æ. barbareæ*, DC.; *Æ. punctatum* (*Æ.* quadrifidum, *DC.*); *Æ. incarceratum*, B. & Br.; *Æ. thalictri*, Grev.; *Æ. depauperans*, Vize (?) *Æ. dracontii*, Schwz.

Of the following species I have no personal knowledge; further research is necessary in order accurately to place them in the above scheme. *Uromyces urticæ*, C.; *Puccinia fallens*, C.; *Xenodochus curtus*, C.; *Uredo plantaginis*, B. & Br.

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THE MEANING OF ENGLISH BIRD-NAMES.

By H. T. Wharton, M.A., F.Z.S.

So much has been written about the meaning of the English names of flowers, that it is strange how those of our birds have been neglected. Much information can be got, scattered about in general ornithological literature, or found in various dictionaries, but it does not seem that anyone has taken up the subject in its entirety.

Of the names of British birds, as they appear in the ordinary standard books, I find there are about one hundred and sixty; of these there are certainly not much more than a dozen of which some account cannot be given. Of course, if all the known provincial names were also taken—as is, I believe, about to be done for the English Dialect Society—this number would probably be increased tenfold, and the difficulties might increase with the numbers.

At present I do not wish to rival the dictionary-maker, but merely to show the meaning—more often poetical, perhaps, than in the case of flowers—of the names we commonly apply to British birds; I shall take no account of those of which no satisfactory explanation can be found.

The names of birds seem to have originated in three different ways; some may be called onomatopœic, or imitative, expressing the characteristic notes which the birds emit; others are taken from peculiarities of colouring or appearance; and the largest class is of those names which refer to peculiar habits, and these seem to be the oldest, for they are often so modified from their original form that it is difficult to find out their hidden meaning. But there are others which are quaintly named from some human attribute or sympathy, or bear some mythological reference; one bird, the Pheasant, is named after the place whence it seems to have been first brought—from the river Phasis, in Colchis, a province of Asia, east of the Black Sea, now known as Mingrelia. There is yet another category, which includes names we can trace directly to Latin or Greek, although often we can go no further.

To begin with those which are imitative, though not all strictly onomatopœic, we have some which so plainly indicate the note they describe, that they require no explanation; these are, to take them in alphabetical order, Chat, such as Woodchat, Whinchat, Stonechat, &c.; Chiffchaff, Crake, Cuckoo, Curlew, Kittiwake, Peewit (in French, *Dix-huit*), Pipit, Skua, and Twite. There can be no question about them for one who knows them in their natural haunts. But it is not so obvious that Bittern comes from the bird's drumming note, or "booming," though there is little doubt about the fact. The names Chough, Crow, Raven, and Rook, all seem to denote the hoarse cries emitted by the Corvine birds. Cirl Bunting has long concealed its origin, but it seems clear that it comes to us from the Italian name *zirolo*, and is connected with *zirlare*, to cry *zi-zi*. Egret and Heron, for all their dissimilarity, are really the same words; both come from

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the old High German *hiegro*, a heron, which Prof. Skeat thinks refers to its harsh voice. *Hiegro* became in French *aigre*, of which the diminutive is *aigrette*, our Egret; *hiegro* also became in Low Latin *aigro*, and (in the tenth century) *airo*, whence the modern French *hêron*, our Heron. Heronshaw means a young Heron, being corrupted from the French *héronceau*, as is proved by the northern form, Heronsew; but Heronshaw, meaning a heronry, is a "shaw," or wood where Herons build. Finch, like the provincial Pink and Spink, is probably connected with "spangle," and the Lettish *spingeti*, to glitter; it means not so much the "bright" as the "clear-voiced" bird; from the same root we have in Greek φέγγος, light, and φθέγγομαι, I speak. Hoopoe is cognate with the *upupa;* those who have had the good fortune to hear its note say that it is even sweeter than the Cuckoo's; the French word *huppe* came to mean a tuft of feathers, from the Hoopoe's tufted head. Owl is the bird that "howls": dropping h's is a habit as old as language itself. Quail was in Dutch *quackel*, i.e. the bird that "quacks"; the present form comes from the French *caille*, in old French *quaille*, Italian *quaglia*, from the Low Latin *quaquila*. Rail is the bird that "rattles"; in old Dutch *rallen* was short for *ratelen*, to rattle; the French *râle* means a rattle as well as a rail. Shrike is the bird that "shrieks." Siskin is akin to the Dutch *sissen*, to hiss or twitter. Turtle, from the Latin *turtur*, through its French diminutive *tourterelle*, is the bird that cries *tur-tur*. Whooper is expressive of the Wild Swan's loud and trumpet-like notes.

In my next category, where names of birds are derived from their appearance, many sufficiently explain themselves, such as Blackbird, Blackcap, Bluethroat, Crossbill, Firecrest, Goldcrest, Goldfinch, Golden-eye, Greenfinch, Greenshank, Grosbeak, Pintail, Razorbill, Redbreast, Redpoll, Redshank, Redstart (where start is the Anglo-Saxon *steort*, a tail), Redwing, Stilt, Waxwing, Whitethroat, Wryneck, and Yellowshank. In others, however, the meaning is considerably obscured, either by the successive changes through which the name has passed during its development from the primitive form, or from cognate words having dropped out of use. Avocet is in Italian *avocetta;* Prof. Skeat, to whom I am indebted for many valuable suggestions, finds that in Spanish the Wigeon is called *avucasta*, and this he connects with our word "avocet"; perhaps the delicate appearance and purely contrasted plumage of the bird may have gained it the name of *avis casta*, the "chaste bird." Avocet, Bustard, and Ostrich are thus all compounds of the Latin *avis*, a bird, notwithstanding their dissimilarity: *avis casta*, *avis tarda*, and *avis struthio* having been the original forms. Brent is probably "burnt" goose, from its generally charred appearance. Coot is the "bob-tailed hen"; it is in Welsh *cwtiar*, from *cwta*, short, bob-tailed, and *iar* a hen; so that coot is cognate with "cut." Cormorant is from *corvus marinus*, the "sea crow"; the Portuguese call it *corvo-marinho*, but our word may be confused with the Latin *corvus*, a crow, and the Breton name for the Cormorant, *morvran*, from *mor*, the sea, and *bran*, a crow. Dunlin is the "little dun bird." Falcon is the bird with "hooked" claws, from the same stem as the Latin *falx*, a sickle. Grebe is akin to the Breton word *krib*, a comb, and *kriben*, a tuft of feathers on a bird's head. Grouse is probably akin to the French *griesche*, gray, speckled; Prof. Skeat

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thinks it is a false form evolved from *grice*, as if that had been taken to be the plural, like "mouse," "mice." Hemipode is obviously "half-footed," from the Greek, because the hind-toe is wanting. Jay is the "gay" bird, from its gay plumage and chattering ways; "gay" originally meant "full of go." Oriole is from the Latin *aureolus*, the "golden" bird; the French *loriot* was formerly *l'oriol*, the article having become agglutinated, just as "newt" is "an ewt," or "an eft." Phalarope means "coot-footed," from the Greek φαλαρις, a coot, and πούς, a foot, on account of its feet being similarly lobed, not fully webbed. Puffin is from the "puffed-out" appearance of its beak. Ruff is ordinarily said to allude to the "ruffle" of feathers round the neck of the male in the breeding season; but as the female is called a Reeve, Prof. Skeat thinks that the name comes from some different source, indicated by the vowel-change. Serin is French, from the Latin *citrinus*, "citron-coloured." Shag means rough hair, probably in allusion to its crest. Sheldrake is the "variegated" or "spotted" drake, either because it is ornamented with "shields" of colour, or from its being "tortoise-shelled," marked like tortoise-shell, as it certainly is, like a "tortoise-shell cat." Stint is the little or "stunted" sandpiper. Stork is probably from its stalking on "stalks" or lengthened legs. Tit is literally "something small," and not onomatopœic. Titlark is, consequently, the "small lark." Titmouse is compounded of "tit" and the Anglo-Saxon *mâse*, which means various small birds; "mouse" comes from a totally different root, and means "the stealing animal;" so that the plural of "Titmouse" should be "Titmouses," not "Titmice."

Names descriptive of habits are very numerous. The meaning of many is sufficiently obvious, such as Brambling or Bramble-finch, Chaffinch, Courser, Creeper, Dabchick, Dipper, Diver, Fieldfare (the bird that "fares" or travels in the fields, as in "thoroughfare"), Goatsucker (from a superstition which certainly did not originate from actual observation), Hawfinch (where "haw" is a hedge "hawthorn" being "hedgethorn"), Moorhen, Nightjar, Nutcracker, Nuthatch, Oystercatcher, Sanderling (the little dweller on the sands), Sandpiper, Sand Grouse, Shearwater, Shoveller, Swift, Turnstone, Wagtail, Whinchat, Stonechat, and Woodchat, Windhover, Woodcock and Woodpecker. Bullfinch is probably connected with the French name *bouvreuil* which is from the Latin *bovariolus*, diminutive of *bovarius*, "the little neatherd;" just as the Wagtail is in French *bergeronette*, "the little shepherdess;" the idea of "bull" here meaning anything "big" is as unlikely as it is in "bulrush. Dotterel is the bird that "dotes," the "little stupid," from the ease with which it is deceived and caught; in Icelandic *dotta* is to nod with sleep. Dove is the bird that "dives" through the air; a strangely parallel instance is the fact that the Latin *columba*, a dove, is akin to the Greek κολυμβίς, a diver. Duck is the bird that "ducks" or dives its head under water. But Drake is an altogether different word; it is contracted from *ened-rake* or *end-rake*, a masculine form of the Anglo-Saxon *ened*, a duck. In Swedish, *and* is a duck, and *anddrake* is a drake; in German, *ente* is a duck, *enterich*, a drake; the first part of the word being from the stem of the Latin *anas (anat-)*, a duck, and the suffix is allied to the Gothic *reiks*, ruling, mighty, and to *-ric* in "bishopric." So that Drake means "duck-king." Fulmar is akin to "foumart," a pole-

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cat, which is from "foul" and "marten;" in Danish the Marten is *maar*. Gadwal is the bird that "gads" or moves about "well." Godwit is "good wight" or good creature. Goshawk is the hawk that was flown at geese. Grey Lag has been explained by Prof. Skeat (*Ibis*, 1870, p. 301) as the Grey Goose that "lagged" behind to breed—as they did formerly—while the other wild species migrated northwards; "lag" meaning late, last, slow, as in "laggard," a loiterer; a "lag-clock" is one that is behind time. Gyrfalcon is probably the falcon that "flies in gyres," but the history of the name is unsatisfactory; Dr. Coues has lately connected it with *Hiero-falco*, the "sacred falcon"—though that now called the Sacer or Saker is a different species; but guessing in etymology is a fatal method, for all its fascination. Hen Harrier is the hawk that "harries" or kills hens, so that the name is no reason for calling the male the Ringtail, descriptive though it is. Hawk is probably the "seizer," and allied to "have;" the word "havoc," destruction, is derived from hawk, and to "cry havoc" merely meant "ware the hawk." Hobby is the hawk that "hops" about. Kingfisher is the "king of fishers" or the "fisher for a king;" in France it is dedicated to St. Martin, *martin-pêcheur*, perhaps with a similar idea of worthiness. Kite is allied to the Breton *cud*, velocity, and *cudio*, to hover; Cowper speaks of—

> "Kites that swim sublime
> In still repeated circles, screaming loud."

The provincial name Glede means the bird that "glides." Knot is a corruption of Canute, probably in reference to the story of the king's well-known rebuke to his courtiers, from the bird's running along the beach at the edge of the waves. Lapwing has nothing to do with either "flap" or "wing;" it means "one who turns about in running," from the Anglo-Saxon *hledp-an*, to leap or run, and *wince*, one who turns, akin to "winch" and "wag." Linnet is the bird that feeds on lin- or flax-seed, from the French *linotte*. Loon is from the same root as "lame," in allusion to the awkward gait of divers when on land. Mavis is the bird that "destroys the vine," from the French *mauvis*, formerly *malvis* in mediæval Latin *malvitius*, from *malum vitis;* in provincial French it is *vendange*, the vintage-bird, and in German *weingartsvogel*, the vineyard-bird. Merganser is compounded of the Latin *mergus* and *anser*, the "diving goose." Merlin is the hawk that hunts "merles" or blackbirds. Missel-thrush is from its feeding on mistletoe-berries; in Anglo-Saxon *mistel* was used alone in the sense of mistletoe, so that Missel-thrush is rather a variant from, than an abbreviation of, Mistletoe-thrush, its name in many counties. Nightingale is the bird that "sings in the night;" the syllable *—in—*is a case-ending to "night," the *n* being intrusive, as "passenger" is in French *passager;* the Anglo-Saxon *galan*, to sing, is akin to "yell." Noddy means a "simpleton," one who "nods," *i.e.* goes to sleep. Ortolan is the "garden-bird," from the Latin *hortus*, a garden. Osprey is corrupted from Ossifrage, the "bone-breaker." Peregrine is the falcon that was taken on migration, "passage-hawk." Plover is from the French *pluvier*, because, it is said, it only reaches France in the "rainy" season. Pochard is the bird that "poaches," that is, treads into the mire, as cattle do. Scaup is a northern word for a bed of shell-fish, on which this duck feeds. Scoter is the "shooter" or diver. Snipe is the

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"snapper," allied to the old Dutch *schnebbe*, the beak, as the "nib" of a pen is allied to "snap." Sparrow is the "wanton bird," from a root meaning "to swell." Stockdove is the dove that breeds in the "stocks" or trunks of trees, not among the branches. Swallow is the "tosser," or mover to and fro in its flight, like the "swell" of the sea; it is not from the same root as the verb "to swallow." Teal is from the root of "till," like the Dutch *telen*, to breed, cultivate; *teling* is Dutch for a generation, production, as well as for the bird; Prof. Skeat says "the original sense was merely 'a brood' or 'a flock,' and its use as a specific form was accidental; we still use 'teal' as a plural form;" similarly "bird" is "broodling." Vulture is the "tearer," from the root of the Latin *vul-si*, I plucked, tore.

Names of birds that bear some reference to man are a little hard to explain. Colin, the little quail from Virginia, is nicknamed after a French pet form of Nicholas. Guillemot is from the French Guillaume, as the provincial name Willock is from William. In Mag-pie, Mag is short for Maggie, a familiar form of Margaret, like the French *Margot*, which also means a Magpie. In France, a Magpie is generally called *Jacques*, and *jacasser* is to chatter like a Magpie. We have the same in Jack-daw, and probably in Jack-snipe also. Martin is named after St. Martin. French abounds in such names, *e.g.*, Sansonnet, a Starling, is a diminutive from Sanson, for Samson; Jacquot is a parrakeet; Parrot and Parrakeet (French *perroquet*), are both from Pierre, Peter, just as our Petrel is, though there it is in allusion to its walking, like St. Peter, on the waves. Sailors call petrels "Mother Carey's chickens," which is said to be corrupted from the Portuguese *madre cara*, the French *oiseaux de Notre Dame*. Shakspere (*King John*, i., 231) calls the Sparrow Phillip, and the name is at least as old as Chaucer; the French call it *Pierrot*, little Peter. Our Robin is the pet form of Robert; just as we talk of the Tomtit, and the Jenny or Kitty Wren. Prof. Skeat says Lark means "worker of craft," and thinks the name points to some superstition which regarded the bird as of ill omen.

My last category contains names of birds which we have inherited from the Romans or Greeks. Buzzard comes through the French *buse*, from the Latin *buteo*. Bustard is a corruption of *avis tarda*, but it is improbable that *tarda* here means "slow," for Pliny quotes it as the Spanish name, so it is likely to be Celtic originally. Crane is a widely disseminated form of the Greek γέρανος; its Welsh name *garan* refers to its "shanks," akin to the English "garter." Eagle is the Latin *aquila*, through the French *aigle*. Gannet is akin to Gander, and likewise to the root of the German *gans*, Latin *anser*, Greek χήν. Kestrel has been ingeniously traced by Prof. Skeat,* he kindly informs me in a recent letter, to the Latin for a Teal, *querquedula;* this became in old French *quercelle*, now *cercelle*, or *sarcelle;* its diminutive *quercerelle* easily became contracted to *kerc'relle*, and thence became *kestrel;* the French *cresserelle* is obviously corrupted from *cercerelle*. Merle, a Blackbird, is the French form of the Latin *merula*. Partridge

* *The Academy*, October 7, 1882, p. 262.

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is from the Greek περδιξ, through the French *perdrix*; in middle English it was *pertriche*. Pigeon is the French *pigeon*, from the Latin *pipio*, a young chirping bird of no particular species. I have lately shown (*Zoologist*, 1882, p. 110) that Wigeon is similarly formed from *vipio*, a name used by Pliny, so that the spelling "Widgeon" is clearly wrong. Thrush and its diminutive Throstle are allied to the Latin *turdus*.

The remaining English bird-names can most of them be traced back to Celtic or Teutonic sources, but their meaning is either unknown or uncertain, so that it is inexpedient to endeavour to explain them now. On an occasion such as this, I would not willingly detract from the pleasure of anyone who may come after me, by going outside what may reasonably be regarded as ascertained etymological facts. I have only made a collection of derivations, on which I hope to see a stately structure rise that shall show to future ornithologists the depth of the meaning of English bird-names.

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Woolhope Naturalists' Field Club.

THE HEREFORDSHIRE POMONA, 1882.

THE HEREFORDSHIRE POMONA. Containing coloured Figures and Descriptions of the most esteemed Kinds of Apples and Pears cultivated in Great Britain. Edited by Robert Hogg, L.L.D., F.L.S. (London: *Journal of Horticulture.* Hereford: Jakeman and Carver.)

THE HEREFORDSHIRE POMONA.

THERE was not any exhibition of Apples and Pears this October. Part V. of *The Herefordshire Pomona* was published, and has been as favourably reviewed as any of the preceding parts, and gratefully acknowledged by Pomologists and Horticulturists, as the following short extract testifies.

The fifth Part of the Woolhope Club's *Pomona*—for so it may in all fairness be called, although it is a national work in its importance and scope—comes to us at a seasonable time, when the autumn fruit has been garnered, and the students of pomology, like the humbler lovers of apples, are rejoicing in the harvest of Hesperides. We have been impatient for the completion of this splendid work, and have been inclined to wish that it could be issued in half-yearly instead of yearly parts; but we must be satisfied with such progress as the Editor can fairly make, with due regard to the difficulties which beset him, or which beset the *Pomona* Committee of the Woolhope Club. After all, October is the best month in the year for such a publication; and the eagerness of subscribers to have the entire work in their hands, will be less now that the fifth part out of seven has made its appearance. Already the great value of this *Pomona*, as a book of reference for horticulturists may be tested and proved. The present writer seized the opportunity, as soon as the part under notice had come into his possession, of comparing two fruits from his own garden with the figures and descriptions of the *Pomona*. In the case of one of these, the Rymer or Duke of York apple, the achievement of Editor and artists is absolutely perfect; and this comparison merely confirms the opinion which we have already passed on the preceding portions of the work—namely, that *The Herefordshire Pomona* cannot fail to be a standard and model for all future pomologists, and a pattern text-book of horticultural science. We are glad to note that the sixth part is promised for the summer of next year, and the concluding part (with the necessary index—which we hope will contain the synonymes of the names adopted by Dr. Hogg) for

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1884. We fear it would be too much to ask the Committee and their Editor to produce Part VII. much of which will consist of plain letterpress, before the end of next year.

The principal contents of Part V. are the plates and the description of the Golden Pippins, the Red Hawthornden, the Queen and Rymer, the Cornish Gilliflower, amongst several dozens of garden and cider apples; and the Colmars, Doyennés, Bishop's Thumb, Napoleon, and two or three Beurrés amongst the pears. The Arlingham Squash, Aylton Red, and other perry pears are beautifully figured; and altogether we are satisfied that the subscribers will be thoroughly pleased with this addition to the work as they have been with any previous Part. It is rather a pity that Mr. With's analyses are discontinued, if only because the omission will cause a flaw in the symmetry of the work when completed. We must not omit to emphasize our former praise of the good taste, accuracy, and really surprising delicacy of the coloured plates, as prepared for the *Pomona* by Miss A. B. Ellis and Miss E. E. Bull, and chromo-lithographed by Severeyns, of Brussels. Nothing could possibly have been better. We take leave to thank the Woolhope Club in the warmest terms for this admirable contribution to the literature of the garden and orchard.

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PRINTED BY JAKEMAN & CARVER, HEREFORD.

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INDEX

TO THE

TRANSACTIONS OF THE WOOLHOPE CLUB

FROM COMMENCEMENT IN 1851, TO THE END OF THE YEAR 1882,

WITH

LISTS OF ITS PRESIDENTS, ANNUAL AND FIELD MEETINGS, ILLUSTRATIONS, &c.,

COMPILED BY

REV. FRANCIS T. HAVERGAL, M.A.,

VICAR OF UPTON BISHOP, AND

PREBENDARY OF COLWALL IN HEREFORD CATHEDRAL.

1888.

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Meetings of the Woolhope Club

(ANNUAL).

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Note.—The early *Transactions* of this Club appeared as pamphlets, in paper covers.

No. 1 was printed in 1856.
No. 2 ,, 1857.
No. 3 ,, 1861.
No. 4 ,, 1863.
No. 5 ,, 1864.
No. 6 ,, 1865.

Most of these are very scarce, so that only two or three complete sets are to be found The Volume for 1866 is the first of the series issued in green cloth binding. Several papers and proceedings of the Club appeared in the *Hereford Times*, 1852-66, about 70 columns.

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Field Meetings.

1852.

May 18.—Woolhope Valley and Stoke Edith.
July 20.—Whitchurch.
Sept. 21.—Aymestry and Mortimer's Cross.

1853.

June 7.—Eastnor.
July 26.—Leintwardine.
Aug. 23.—Kington.

1854.

Jan. 24.—Annual Meeting.
June 13.—Hereford.
July 18.—Leominster.
Aug. 22.—Monmouth Cap.

1855.

Jan. 23.—Annual Meeting.
June 12.—Malvern.
July 24.—Eardisley.
Aug. .—Ludlow.

1856.

Jan. 22.—Annual Meeting.
June 3.—Bromyard.
July 29.—Kington.
Sept. 9.—Abergavenny.

1857.

Jan. 19.—Annual Meeting.
June 2.—Tarrington.
July 21.—Ludlow.
Aug. 25.—Westhide and Shucknell.

1858.

Jan. 26.—Annual Meeting.
June 3.—Ledbury.
July 20.—Bromyard.
Aug. 17.—Usk.

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1859.

Jan. 25.—Annual Meeting.
No Report.
No Report.
Aug. 22.—Usk.
Sept. 8.—Mordiford.

1860.

—Annual Meeting.
June 5.—Saddlebow and Garway.
July 24.—Ludlow.
Aug. 7.—Leintwardine.

1861.

Feb. 7.—Annual Meeting.
May 23 & 24.—Ludlow.
June 21.—Tarrington.
Aug. 9.—Abergavenny.

1862.

Feb. 20.—Annual Meeting.
May .—Ledbury.
June 12.—Usk.
Aug. 14.—Holme Lacy.
Sept. 18.—Church Stretton.

1863.

—Annual Meeting.
June 9.—Forest of Dean.
July 7.—Craven Arms.
Aug. 2.—Pontrilas for Ewyas and Dore Abbey.
Sept. 7.—Malvern.

1864.

Mar. 7.—Annual Meeting.
May 24,—Kington.
June 21.—Hay.
July 21.—Ross.

1865.

Feb. 14.—Annual Meeting.
May 18.—Builth.
June 22.—Abergavenny for Crickhowell.
July 18 & 19.—Ludlow and Craven Arms.
Aug. 28.—Usk.

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1866.

Feb. 22.—Annual Meeting.
May 24.—Talgarth.
June 26.—Kington.
July 27.—Ross (Ladies' Day).
Aug. 24.—Builth.
Sept. 12.—Malvern.

1867.

Feb. 26.—Annual Meeting.
May 28.—Colwall.
June 28.—Llandrindod.
July 18.—Graig-y-pwll-ddu (Ladies' Day).
Aug. 6.—Craven Arms for Clun.
Aug. 27.—Hereford for Woolhope.

1868.

Mar. 26.—Annual Meeting.
May 22.—For Hampton Court Estate.
June 19.—Crumlin and Pontypool.
July 14.—Penwyllt and Scwd Hen Rhyd (Ladies' Day).
July 28.—Ludlow for Clee Hill and Oakley Park.
Aug. 25.—Hereford for Woolhope.
Oct. 9.—Hereford, for Fungus Foray.

1869.

Mar. 1.—Annual Meeting.
May 20.—Wall Hills and Ledbury.
June 25.—Pontrilas.
July 20.—Ludlow and Downton (Ladies' Day).
Sept. 3.—Usk.
Oct. 1.—Hereford for Fungus Foray.

1870.

Feb. 22.—Annual Meeting.
May. 24—Forest of Deerfold.
June 21.—Ross and down the Wye (Ladies' Day).
July 22.—Llangorse Lake.
Aug. 19.—Longmynd Hills.
Oct. 6.—Hereford, for Fungus Foray.

1871.

Feb. 23.—Annual Meeting.
May 25.—Hay, for Cusop Dingle.
June 27.—Aberedw Rocks (Ladies' Day).
July 21.—Chepstow.
Aug. 29.—Ross, for Forest of Dean.
Oct. 10.—Hereford, for Fungus Foray.

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1872.

Mar. 1.—Annual Meeting.
May 17.—Malvern.
June 21.—Pontypool.
July 26.—Meerbach Hill (Ladies' Day).
July 29.—Special—Cornets Bridge, for Felton.
Aug. 20.—Tenbury.
Oct. 10.—Fungus Foray—Whitfield.

1873.

Mar. 2.—Annual Meeting.
May 15.—Moorcourt.
June 13.—May Hill.
July 11.—Ludlow and Richard's Castle (Ladies' Day).
Aug. 26.—Brecon.
Oct. 21 to 24.—Fungus Foray.

1874.

Mar. 2.—Annual Meeting.
May 15.—Church Stretton.
June 19.—Builth.
July 17.—Ross and Doward Caves (Ladies' Day).
Aug. 18.—Lydney.
Sept. 29.—Fungus Foray.

1875.

Apr. 12.—Annual Meeting.
May 20.—Caerleon.
June 15.—Symonds' Yat and Buckstone.
July 18.—Skenfrith and Grosmont (Ladies' Day).
Oct. 14.—Fungus Foray.

1876.

Mar. 9.—Annual Meeting.
May 23.—Stoke Edith.
June 27.—Llanthony (Ladies' Day).
July 17.—Old Radnor and Stanner Rocks.
Aug. 25.—Brown Clee.
Sept. 28.—Fungus Foray.
25.—Special Meeting—Pomona.

1877.

Feb. 13.—Annual Meeting.
May 17.—Mordiford. (Not held.)
June 19.—Midsummer Hill.
Aug. 21.—Tintern (Ladies' Day).
Sept. 20.—Mordiford.
Oct. 4.—Fungus Foray.

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1878.

Apr. 23.—Annual Meeting.
May 28.—Ledbury, for Putley and Kempley.
June 20.—Ross, for Symonds' Yat.
July 18.—Forest of Dean (Ladies' Day).
Aug. 22.—Leominster and Croft Ambery.
Oct. 3.—Fungus Foray.

1879.

Apr. 15.—Annual Meeting.
May 30.—Kington.
June 27.—Buildwas and Wenlock.
July 29.—Downton (Ladies' Day).
Aug. 29.—Hay.
Oct. 2.—Fungus Foray.

1880.

Apr. 15.—Annual Meeting.
May 20.—Herefordshire Beacon.
June 22.—Buildwas.
July 27.—Tintern (Ladies' Day).
Aug. 24.—Church Stretton.
Oct. 5 to 12.—Fungus Forays.

1881.

Apr. 19.—Annual Meeting.
May 19.—Tewkesbury.
June 17.—Wigmore.
July 12.—Rhayader and Cwm Elan (Ladies' Day).
Aug. 11.—Croft and Aymestry.
Oct. 3 to 8.—Fungus Foray.

1882.

Apr. 13.—Annual Meeting.
May 25.—Arthur's Stone and Dore Abbey.
June 29.—Coxwall Knoll and Brampton Bryan.
July 25.—Brecon and the Beacons (Ladies' Day).
Aug. 22.—Ivington Camp.
Oct. 2.—Fungus Foray.

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WOOLHOPE NATURALISTS' FIELD CLUB.

PRESIDENTS

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1852	Lingwood, Mr. R. M.
1853	Lewis, Rev. T. T.
1854	Symonds, Rev. Wm. S., F.G.S.
1855	Crouch, Rev. J. F.
1856	Wheatley, Mr. Hewitt
1857	Lingen, Mr. Charles
1858	Brown, Dr. G. P.
1859	Crouch, Rev. J. F.
1860	Banks, Mr. R. W.
1861	Lightbody, Mr. Robert
1862	Hoskyns, Mr. Chandos Wren
1863	Hoskyns, Mr. Chandos Wren
1864	Crouch, Rev. J. F.
1865	Steele, Mr. Elmes Y.
1866	Bull, H. G., M.D.
1867	Hoskyns, Mr. Chandos Wren
1868	McCullough, D. M., M.D.
1869	Rankin, Mr. James
1870	Cooper-Key, Rev. H.
1871	Cam, Mr. Thomas
1872	Steele, Mr. Elmes Y.
1873	Davies, Rev. James
1874	Davies, Rev. James
1875	Robinson, Rev. C. J.
1876	Chapman, T. A., M.D.
1877	Morris, Mr. J. Griffith
1878	Phillott, Rev. H. W.
1879	Armitage, Mr. Arthur
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1882	Blashill, Mr. Thomas, F.R.I.B.A.

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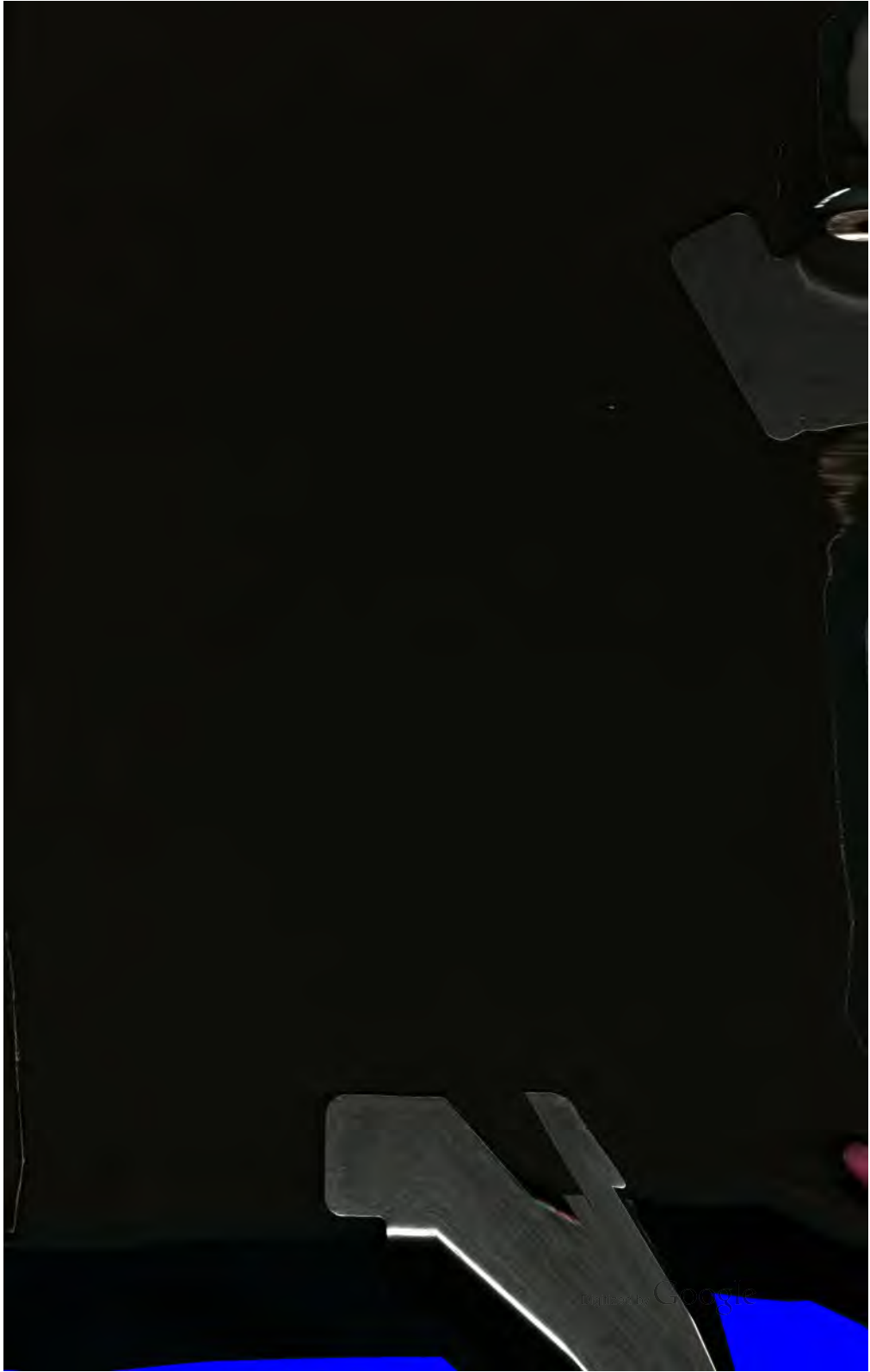
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